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Diving

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Australia*

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SARGASSUM

Charting New Waters

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Diving & Snorkeling

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Jewels of the Sound JACK WATSON 16

Washington's San Juan Islands offer beauty, solitude and great diving. Rich in history and marine life, these islands have long been a mecca for independent, adventurous spirits.

Uniquely Belize WALT STEARNS 22

Featuring 170 miles of barrier reef, three true atolls and spectacular drop-offs, this small, tranquil country has achieved world-class diving status.

Mountain Lake Shipwrecks RUSS BELLICO 28

Many an old steamboat lies below the cold, clear waters of New Hampshire's Lake Winnepesaukee.

Down Under ROBERT MCQUILKIN 40

Australia's Great Barrier Reef is vast, yet only a small part has been explored by divers. Diving this fabled destination is truly one of the great experiences of the sport.

New Waters ROBERT ROBINSON 44

Lying 20 miles off Point Reyes, California's Cordell Bank is a unique marine environment seldom seen by divers.

With Gold JIM WILTENS 72

Every spring, heavy rains wash gold into California's rivers and streams. Most of it is accessible only to divers.

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A huge floating island of weed, completely encircling Bermuda, this strange plant is home to a number of unusual creatures.

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In recent years, California's kelp beds have been ravaged by storms, El Nino currents and an invasion of sea urchins. Unusual methods are being used to save and restore the kelp which is vital to California's coastal environment.

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When a long-awaited supply ship sinks in the harbor, it's a bad day for the island, but a great experience for divers.

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What could be better than a diving trip that never ends. Ask Americans who work at Caribbean dive resorts before packing your bags.

Your Best Shot ERIC HANAUER 36

Taking any good underwater photo is a challenge, but to get great shots in deep water requires special techniques.

Advent of the Tri-Vent ERIC HANAUER 56

SCUBAPRO has just introduced the first new design concept in masks in many years. Here's a first look at the revolutionary Tri-Vent mask.

Clearing the Air on Surface Air Supply ROBERT BURGESS 68

Once called hookah rigs, SAS is an often misunderstood breathing system with special applications in diving.

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Cover Photo of manta ray by
Manny Montoro.

Five years ago this month, SCUBAPRO Diving & Snorkeling appeared on newsstands nationwide and abroad for the first time. The purpose of the new magazine, as stated by Publisher Steve Ferber, was to offer divers a publication "that effectively and thoroughly reflects the joys and personal satisfaction provided by the diving sports . . . while providing editorial material of interest to everybody." Our commitment to these goals is reflected in every issue.

SCUBAPRO's total dedication to the advancement of the sport through diver education and by providing the highest quality equipment has been of tremendous importance to the success of Diving & Snorkeling. And the support of you, our readers, has been most gratifying.

In this edition, aspects of the entire world of diving are featured. Divers looking for new adventures will find them in Robert McQuilkin's excellent article beginning on page 40 on diving Australia's fabled Great Barrier Reef. If your budget can't be stretched halfway around the world, diving a barrier reef can be accomplished much closer to home. Join Walt Stearns as he explores the 170-mile reef off the shores of Belize on page 22. This Central American country, facing the Caribbean, offers varied diving including coral atolls. Put aside any fears of political unrest. Belize has a very stable government which not only welcomes divers but is striving to preserve the thriving marine community found within her waters.

Until recently, the Cordell Bank, 20 miles off California's Point Reyes, had been popular only with marine life and offshore fishermen. That ended when Dr. Robert Schmieder noticed the bank on a navigation chart and wondered why he'd never heard of anyone diving it. The rest is history. Schmieder was the first to explore these extraordinary pinnacles that attract fabulous numbers of marine animals. Today, efforts are underway to have the Cordell Bank designated a National Marine Sanctuary. Robert Robinson's account of the initial expeditions begins on page 44.

Two of the most common but often overlooked marine plants are given close scrutiny beginning on page 8. As writer/photographer Larry Lipsky points out, the only time a diver usually notices the sargassum plant is when it gets tangled in the dive boat's prop and must be cleared. Yet sargassum is so unusual, a number of marine animals have adapted to living entirely within its floating mass.

The Sargasso Sea, a 50,000-square-mile floating island of the plant completely surrounds Bermuda and is part of the famed Bermuda Triangle, source of many mysterious ship losses over the centuries.

On page 52, Joni Dahlstrom reports on the crisis surrounding California's once thriving kelp forests. Ravaged by storms, El Nino currents and an invasion of sea urchins, large kelp beds have been destroyed. Read about the unusual methods being attempted to restore this vital plant to its former range.

Dive vacations always end too soon. If you've ever been tempted to stay on permanently, be sure to read Cathie Cush's article beginning on page 32. Cathie sent questionnaires to 60 divemasters and resort operators to compile her informative survey on what it's really like to live in Paradise. Believe her, it's not for everyone!

If there's a topic or place you'd like us to look into, drop a note and we'll get right on it. In the meantime, good and safe diving.

Edward Montague

Editor's Page

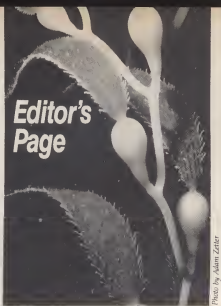


Photo by Adam Zitter

What Ever Happened To The Mask?



Scubapro just rewrote the book on how masks are designed. First we made a better purge valve, then built a mask around it. The result is the Tri-Vent, the biggest, brightest panoramic view in the underwater world. It's the first totally new mask design since Scubapro introduced silicone over 15 years ago.

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What lures most divers to the Florida Keys and the Caribbean are the beautiful coral reefs and exotic, multicolored marine life. Enroute to the dive destination, our minds are filled with anticipation of the excitement awaiting on the reefs below. Seldom noticed are large areas of floating sargassum seaweed along the way.

Divers usually ignore this seemingly useless annoyance, except to curse it when clumps of the yellow weed get entangled in their dive gear or foul the boat's propeller. Little thought is given to the unique and exciting marine life living among this weedy nuisance. An entire community of sea creatures including some very odd looking fish, shrimp and crabs call sargassum their home. Exploring life in the weeds can be as rewarding as a reef dive.

it afloat. This weed gets its name from the Sargasso Sea, a 50,000-square-mile area of the Atlantic Ocean, several hundred miles off the eastern coast of the United States.

Completely encircling the island of Bermuda, the Sargasso Sea is where the largest formations of the weed are found. Resembling the center of a huge O-ring two-thirds the size of the United States, the Sargasso Sea is surrounded by strong ocean currents flowing in a clockwise direction causing extremely calm conditions in the sea's center. Here, immense areas of weed gather and float motionless. The lack of wind and ocean currents at the sea's center spawned myths of sailing vessels venturing into this area only to be helplessly trapped forever in a blanket of floating seaweed.

There are an estimated 10 million tons of sargassum weed found here. Many experts believe sargassum weed has an



The sargassum fish is perfectly color matched to the weed it lives in. The sargassum crab, right, also spends its entire life in the plant.

This floating island of weed covers 50,000 square miles and completely encircles Bermuda. It is the home of many unusual marine animals.

The World of Sargassum

Sargassum weed is easily recognized by its golden brown coloring and the tiny pea-shaped air sacs that help keep

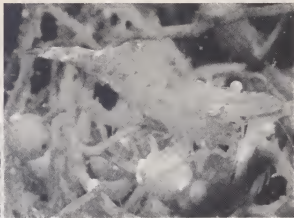
BY LARRY LIPSKY

Larry Lipsky is an underwater and nature photographer specializing in the marine life of the Florida Keys. His work has also been published in Oceans, Underwater U.S.A., Ocean Realm, and Outdoor Photographer.

extremely long life, and can reproduce and grow without ever being attached to the ocean floor. Much of the weed seen today may have been the same the early explorers from Europe saw on their journeys to the New World.

Not all the ocean's sargassum weed is found within the Sargasso Sea and this area may actually serve more as a final resting place for the weed than its ac-

Two other inhabitants of the floating islands are the shrimp, right, and the sargassum pipefish.



tual place of origin. Much of the sargassum weed found here may have at one time lived anchored to the rocks and reefs of the Caribbean and eastern United States. Torn away by storms and ocean surges, the plants were carried northward by the Gulf Stream, perhaps for many years, until finally finding their way into the calm of the Sargasso Sea.

During the summer, large areas of sargassum form off the Florida coast and the Keys. This offers the diver an ideal opportunity to explore the sargassum and its many unique inhabitants. All that is needed is your basic snorkeling gear and a keen eye. If macro photography is your thing, hidden among the leaves and berries, a golden bonanza of tiny subjects await your discovery. At first glance sargassum may seem void of life, but a close and careful examination will reveal the weed is indeed alive with animal activity.

Dozens of different species of fish and invertebrates are adapted to weed life. Camouflage is the key to survival. One quickly notices that most of the creatures share the same coloring and patterns as the sargassum leaves. Venturing too far from the protection of the sargassum could result in becoming a meal for some other creature. Born in the weed, many of these animals mature, reproduce and die without ever leaving the safety of their floating home. All the ingredients of a complete food chain, from microscopic plankton to large pelagic fish, are found here with

each creature depending on the other for survival.

Tiny shrimp and crabs, many smaller than a fingernail, can be seen clinging to the sargassum leaves they so closely resemble. Most feed on plankton and other tiny animals found floating within the sargassum weed. Growing no larger than about three inches, the brilliant gold-colored sargassum crab is one of the more beautiful crabs in the Atlantic Ocean.

Small file and triggerfishes can often be observed swimming in and out of the sargassum. Occasionally baby jacks and other pelagic predators are found here as well. Perhaps these fish hatched at the surface and use the sargassum as a temporary shelter until they reach a more formidable size, when they can safely roam the open ocean.

Appearing like a stalk of sargassum weed, the sargassum pipefish is a worm-like fish closely resembling a tiny trumpet fish. Rarely growing larger than five or six inches, the pipefish usually waits motionless to feed on tiny plankton as it floats by. Its feeding method is somewhat unique. By using its mouth as a tiny vacuum cleaner, the pipefish inhales its prey by quickly sucking in water. The pipefish is a member of the Syngnathidae genus, which includes sea horses. Sharing the same temperament as the timid sea horse, the pipefish never swims far from the safety of the sargassum, for to do so would make him a most easy prey.

More aggressive than the docile pipe-

fish is the sargassum fish, a creature whose appearance more closely resembles a remnant of prehistoric times than anything from the present. Attaining a length of about four inches, the sargassum fish is extremely well suited for its environment. Appearing exactly like a clump of seaweed, the sargassum fish is truly the master of camouflage in the Sargassum World. Hidden so perfectly, this fish is almost impossible to distinguish from the golden sargassum leaves surrounding its body. With leaf-like fins and appendages growing out of its sargassum colored body, and white skin blotches resembling marine worms, the sargassum fish waits for unsuspecting prey to pass by. A voracious feeder, the sargassum fish swallows its victim whole, sometimes devouring fish half its own size in a single gulp.

Quite often found is the sargassum sea slug; sort of a snail without a shell. It too shares the same coloring as the sargassum and seems to feed directly on the plant leaves. These leaves ironically are its only defense since its soft, rather shapeless body would be quite vulnerable without the protection of the sargassum.

Occasionally large sea turtles can be seen with their heads poking out of the water, sunning themselves among large patches of sargassum. Some marine biologists believe baby sea turtles after hatching on the beach, seek the shelter that the sargassum weed provides. Feeding on smaller animals, the turtles would remain about a year until they are mature enough to survive the open ocean.

Even large reef dwellers, such as grouper and snapper, sometimes suspend under the cover of the sargassum weed, feeding on the smaller fish found there. Off the eastern coast of Florida, fishermen seek out large patches of sargassum, known locally as weed lines, in the hopes of catching dolphin, a tasty game fish (not the mammal) which frequently feeds on the smaller baitfish hiding among the weed. Other fishes such as the flying fish use the sargassum weed for nests to lay their eggs, which resemble the tiny sargassum berries and are usually left alone by other sea creatures.

Birds such as gulls and terns also benefit from the sargassum and commonly feed in large flocks on the small baitfish found at the surface among the floating weed.

As a shelter and food source for many creatures, the sargassum is an intricate part of the ocean environment. And, although the reef may always beckon with its own beauty and excitement, a brief visit to the Sargassum World will prove a memorable and enlightening experience for any diver.

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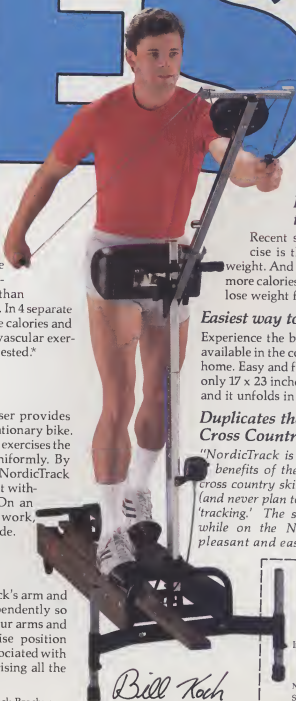
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An automobile sits on the deck and the ship's compass; both were photographed the day the ship sank.

Located off the southwest tip of India, these remote islands rely on infrequent supply ships. When one sinks within the harbor, it is a major catastrophe.

A Very Bad Day for the Maldives

It was a black day for the Maldives, and yet one of those lucky days that occurs perhaps only once in a diver's lifetime. Friday, the 13th, was a tragic day for the captain and crew of the 3,500-ton, 110-meter *Maldivo Victory*. A very unlucky day it was, too, for the various hotels located on the six Maldivian islands the freighter was to have brought supplies for the next two months. For on this unfortunate day, the *Maldivo Victory* ran aground in the harbor of Male, the capital of the Republic of the Maldives.

The captain of the ill-fated freighter lost his way early in the morning in the

buoy-marked channel of the harbor and steered his ship at almost full speed onto the reef just before Hulule, the islet where the airport serving the Maldives is located. Its hull gashed, the *Maldivo Victory* sank within minutes in 30 meters of water. Luckily, all passengers as well as the captain and crew safely reached land. A few hours after the accident I was officially called to the site of the catastrophe. The following is my report of the incident.

The report of the *Maldivo Victory's* sinking reached our dive station on Meerufen-fushi by two different channels. With a face as long as a Maldivian sunset, our resort manager informed us of the disaster that had overtaken the eagerly awaited freighter out of Singapore. Of the \$90,000 in supplies he had ordered—which now lay at the bottom

of the harbor—nothing, he feared, had been covered by insurance. More informative—and enticing—however, was the report we received from our friends at the neighboring Eurosub dive station in Kurumba. They, as we, had slept through the moment of the disaster although their dive station lies only a

BY KURT AMSLER

Kurt Amsler is an award-winning Swiss writer, photographer and filmmaker. He is also the author of *Enchanting World of the Seas*.



Divers look unsuccessfully out of place removing a bell from the deck and on the bridge of the *Maldivo Victory* less than 24 hours after she sank.

stone's throw from the site of the *Maldiva Victory's* resting place.

It was, as we were later informed, precisely 4:50 a.m. when the freighter rounded the bend into the harbor of Male, apparently at too high a speed, and struck the reef just before the airport islet of Hulule. Rumor soon had it the captain had imbibed too copiously the night before, a possibility that could certainly not be ruled out, as we ourselves later saw several empty and half-

empty whiskey bottles in the captain's cabin when we dove the wreck.

Our friends from Kurumba had rushed to the wreck at daybreak only to be arrested by the National Security Service! After being detained at the police station for three hours, they were asked to go back and dive—this time with an official government order to prepare a detailed report on the situation.

The situation, as it turned out, was rather confused. To protect against plun-

derers, police boats were sent to circle above the wreck. Roughly a third of the ship's cargo consisted of alcoholic beverages whose sale in the Maldives is subject to strict regulation. Black-market traders would have been only too happy to get their hands on this treasure of booze.

Swinging into action just as quickly were the managers of the islands' hotels, whose "liquid capital" lay 30 meters deep. All the diving instructors of the

Bubbles continue to escape from the wreck as a diver prepares to remove cargo.



neighboring dive stations were asked if they would help in salvaging the urgently needed supplies, both bottled and otherwise.

As a result of the emergency, the disaster site became a diving instructors' convention, the likes of which are seldom seen! Everybody came: Fritz Rasshofer from Villigili, Rudi Fux from Velassaru, Herwath Voightmann from Bandos, "Stolli" Stollberger from Furana, Chris Floden from Kurumba, David Wivel and Chris Ritz from Meerufen-fushi, and many new faces to the Maldivian diving scene.

Above the wreck, the scene was relatively calm as we prepared to dive. A few large dhonis (the name of the native boats) had been made fast with thick tow ropes to the eight-meter-deep tips of the *Maldivic Victory's* masts. The dhonis were to serve as salvage platforms once operations got under way.

As is always the case with wreck dives, we were caught by a mixture of secret expectation and the excitement of discovery. From the surface, the ship could be clearly seen. It lay—and still does—as if carefully sunk for a diving attraction. The keel is at 32 meters on the edge of the reef, the main deck at 24 meters and bridge at 18 meters. From this standpoint alone, the 110-meter *Maldivic Victory* presented an imposing sight. All of the cargo hatches were open, their covers having floated off.

The first salvage diver was already at work as we went down: a local Maldivian in swim shorts with a 10-liter tank. He tore open large crates of Nestle baby milk. The big blue cans floated languidly to the surface, where they were fished out of the water amid shouts of joy and jubilation.

We had enough air for one hour, including the necessary decompression time. Our first task was to take photos. These would show for the first time, a large ship that had sunk only hours earlier and was still almost untouched.

The badly damaged bow revealed a large tear just below the waterline. Barely 10 years old, the *Maldivic Victory* was not fitted with watertight bulkheads. As a result, the single, large gash in the bow was enough to send the freighter to the bottom within minutes. Slowly, we swam through the clear water, past the ship's bell, the cargo holds, past factory-new automobiles still tied down on the foredeck. A jungle of cargo booms, covers and crates, filled to the top with wine, champagne and spirits of every description met our eye.

The bridge was exactly as it had been a few hours before when the captain and his officers had abandoned it. The engine room telegraph stood at "stop"—where else? The latest in navigational equipment filled the bridge; a radar



A lift bag brings a chest to the surface.

screen glowed faintly in the diffused light. The ship's navigational compass was also still intact, while next to it the wooden steering wheel was turned completely to the left, showing the frantic last-minute attempt to avoid the reef. Everything was undamaged; all the ship's navigational equipment seemed ready to function, were she not sitting on the bottom.

From the bridge, we made our way to a door marked "Captain." The cabin wall was caved in and we swam carefully between the door and the partition. What a sorry sight! A writing table was turned over; a uniform jacket clung to a lamp shade. In a corner of the cabin we found the *corpus delicti*—a collection of empty whiskey bottles.

Leaving the captain's cabin, we swam along the railing to the stern. The screw and rudder were enormous. My diving partner, Chris Ritz, looked like a midge next to them. A few minutes later, we were able to observe the entire ship from the flying bridge, the highest point of the ship, next to the large smoke stack. Much was still to be seen from this vantage point, and many photos were still to be made, but we would have time for this during the salvage operations.

The wreck was not without its perils. We encountered a very strong current, and numerous ropes, wires and cables coiled dangerously in the water. We

were also aware that the heavy cargo booms could come loose any minute and topple down on us. Whether the freighter had really found its final anchorage or would slip deeper or tip over were questions no one could yet answer. For these reasons, particular care had to be taken in regard to salvaging the cargo of this new victim of the sea.

But it was time to get down to work. We wanted to find the wooden containers with the name of our island on them in order to bring them up late in the afternoon. As we suspected, they were at the very bottom of the hold under large containers of bottles and canned goods. Chris, grinning from ear to ear, soon uncovered a case of Chateau-neuf-du-Pape. But his joy was short-lived. The pressure at over 30 meters had pushed in all the corks. Another disaster! Later, we discovered more about this law of physics. Champagne corks held for a day, while whiskey and cognac caps lasted only two to three days.

Later, we met with a government representative, with whom we discussed how to best organize the salvage operations. We came to the conclusion that only mutual effort on the part of all involved would suffice to bring up as many of the sunken supplies as possible before the sea claimed them. During the next few days, we worked in teams of four to five dive instructors and local divers heaving boxes and containers into hastily requisitioned nets, which were then hoisted up to the salvage platforms.

The cargo holds emptied rapidly, but we also saw that much of the ship's equipment secretly disappeared at an equally fast rate over the next couple of days. But then, who could begrudge the hard-working divers a souvenir of the Friday wreck at Male?

As occupied as we were with the salvage operations, we still couldn't help but entertain a few sobering thoughts. What if, instead of a freighter, the *Maldivic Victory* had been a tanker? Just the freighter's remaining fuel—and there wasn't much left—had been enough to foul the paradisiacally beautiful beach of a neighboring island to the point of non-recognition. We also wondered how was it possible that a captain of an ocean-going ship could not bring his charge into a harbor whose entry is enormous? Was the captain drunk, or was he simply not capable of making this obviously elementary maneuver?

Today, there are many ships sailing the seas of this globe whose crew members, right up to the captain himself, practice their trade with invalid or illegal documents. We can only hope that official steps will soon be taken to erase this smear on the otherwise immaculate name of the world's merchant marine.



An orca cruises off San Juan Island. A long-spined sea urchin perches on a rock scallop.



Photo by Jerry Martin

Jewels of the Sound

Above the waterline, the cluster of giant boulders was covered with a snowy carpet. Called Peapod Rocks, they appeared to be strictly for the birds. But underwater we

BY JACK WATSON

Jack Watson is an avid diver who worked for the American Red Cross for many years as a water safety and YMCA diving instructor. Jack lives in the shadow of Mount Ranier.

found an alluring world teeming with marine life. Fish of all sizes and shapes darted, glided, or rested quietly among the subaqueous valleys and ridges radiating from the base of each rock.

We were in the middle of the San Juan Islands located in the northern waters of Puget Sound within the boundaries of the State of Washington. Fifty of the islands are covered with evergreen forests and lush vegetation and are habitable. Hundreds of others are tide-

washed reefs and rocks that are hazards to navigation but offer a fascinating resource for divers.

Within a few minutes of submerging among Peapod Rocks, I speared a ling cod of about 20 pounds. My diving buddy, Mike Sorber, dispatched another ling which appeared to be an identical twin. This was quite appropriate for the location since the fish were as alike as two peas in a pod. The ling were more than enough to satisfy our culinary de-

Lying within the waters of the State of Washington, the San Juan Islands have long been a mecca for those seeking beauty and solitude.

sires so we surfaced and hoisted the fish into Mike's boat. We exchanged spearguns for goody bags and submerged again.

Very tenderly, we removed a half dozen of the largest and prettiest long-spined sea urchins from the rocks. One does not clutch these purple or red creatures in a viselike grip. In the San Juans, urchins are profuse and grow to a large size. They are members of the echinoderm or starfish family but do not appear much like a starfish until the underside, the part which clamps against a rock, is closely examined. There a five-rayed pattern of tube feet similar to the starfish can be seen. Although the legal limit is 18 urchins per person, we only wanted a few but as we couldn't get more than two in our bags, we had to carefully carry a third in our gloved hands.

Later, at Moran State Park on Orcas Island, we boiled the urchins for about 15 minutes in an old kettle. After they had cooled, we easily rubbed off the softened spines and washed out the messy insides. The orange eggs are delicacies with a flavor that resembles an under-ripe peach or papaya. A little lemon or lime juice enhances the taste.

The urchin has a most unusual mouth with five teeth-like plates on a structure resembling an old Greek lantern. This portion is named Aristotle's lantern because he was the first scientist to describe it. The remaining shell can be dried and is an interesting ornament for a bookshelf, fireplace mantel or table. If left natural, the shell will dry to a nutlike brown color with a slight red or purplish cast. To bring out the delicate porous design most effectively, we soak the shell in a mild bleach solution so it turns white. The pores and spine nodules then show up very clearly but the shell becomes somewhat weakened and can be easily broken. Mike has discovered that clear fiberglass resin used on boat hulls is an excellent coating for sea urchin shells, giving them almost as much bounce and toughness as golf balls.

During the Christmas holidays, Mike decorated the family tree with sea urchin shells he spray painted various colors and rigged with wires for hanging. He also discovered that the thin, porous shells glowed beautifully when they

were placed over colored Christmas tree lights. The smaller green urchin shells are ideal for this purpose.

During many years of diving among the San Juan Islands, I have stayed on most of the major islands and I enjoy them all, but my favorite is Orcas. My interest in the San Juans and particularly Orcas Island was first sparked more than 30 years ago when I read two national best-selling books written by Northwest authoress Beatrice Cook. Bea contended in her books, *Till Fish Us Do Part*, and *More Fish to Fry* that families can have more fun per acre in the San Juans than any place else you can name. She wrote about the life she shared with her physician husband Dr. William Cook and two vigorous sons who loved to fish, particularly among the San Juans. Bea firmly believed the older people who came to live in these low-pressure, high-pleasure islands did not retire; they got a 100,000-mile, 20-year guaranteed retreat.

Until I actually visited the San Juans, I was rather skeptical about Bea Cook's enthusiasm, but I soon learned she was absolutely justified. To my delight, I got to meet her during my second visit to Orcas Island. I had one of the most enjoyable conversations of my life with this charming, lovely woman who knew more about the lore and lure of the San Juan Islands than any other person I ever met. She was also tremendously interested in underwater experiences as one of her two sons had taken up scuba

diving. This son, Commander Robert C. Cook, is now a retired Navy dentist who lives on Orcas Island in the house originally built by his parents. They died some years ago. Bob Cook no longer dives but he has become known as one of the most skilled wood carvers on the island. A much admired carving is a life-size eagle displayed in the Orcas Island Library. The other son, William Jr., is a retired psychiatrist who lives six months of the year in Seattle and six months on Waldron Island which is located about two miles west of Orcas. Waldron is noted for the self-sufficient lifestyle of its few residents. The island has no ferry service, no electricity, and no phones.

There are several reasons why I consider Orcas a special gem of the San Juans. This horseshoe-shaped island is the largest and highest of the entire archipelago with 56 square miles of varied terrain and about 125 miles of rugged shoreline. There are 72 miles of well maintained county roads with a 35-miles-per-hour speed limit. Most people do not exceed the limit since they just naturally relax and slow their pace when they get on the island. Not only is the diving great all around Orcas, but there are all kinds of other recreational delights. Art galleries and gift and book stores abound. There is a public golf course and the Orcas Theatre and Community Center stages high quality performances.

Thanks to the Washington State Ferry System, cars, RV's, and trailered boats



Diver surfaces with an octopus.

Photos by Jerry Martin

are easily transported to Orcas. If you are traveling by ferry, plan to get in line at least an hour ahead of departure time during the summer months. Ferries leave several times a day from the mainland town of Anacortes, located about 60 miles north of Seattle. It takes a little more than an hour to reach Orcas after brief stops at Shaw and Lopez islands.

For those exploring the islands by boat, several marinas provide full services. John Wayne frequently toured the islands on his yacht and often stopped at Orcas.

For those who like to camp and keep expenses down, Moran State Park provides 4,804 wooded acres with two well-equipped campgrounds on the shores of Cascade and Mountain lakes. These large lakes are well stocked with trout. During the summer a supervised swimming area is provided and rental boats and sailboards are also available at Cascade Lake. From the Mountain Lake campground, you can hike two miles along a scenic trail to Twin Lakes where you have a better than average chance of catching some nice trout. Other trails in the park follow cascading streams with breathtaking waterfalls, including one over 50 feet high.



Sea anemones thrive in the waters off the San Juan Islands as do ling cod.

Those desiring plush surroundings should check into fabulous Rosario Resort and Spa. This resort features a full-service marina, a large restaurant, tennis courts, bowling alleys, indoor and outdoor swimming pools, a very complete fitness spa, and 179 deluxe rooms. Rosario was originally developed as the private estate of wealthy Seattle ship-builder Robert Moran. In 1904, the 47-year old businessman was told by doctors he had only a year to live because of a serious heart condition. Moran sold his business, bought almost 20 percent of Orcas Island and began building a huge mansion even though he doubted it would be completed before he died.

Island living soon restored his health and he eventually developed Rosario into the showplace of the San Juans where visitors were always welcome. By 1920, Moran felt so good he generously donated the large tract of land which became Moran State Park. In spite of the doctors' dire predictions, Moran lived to the age of 86.

The highlight of Moran Park and the entire islands is Mount Constitution, a 2,409-foot peak offering a spectacular 360-degree view considered one of the finest in America. This panoramic sight alone is worth a trip to Orcas Island. A six-mile asphalt road with hairpin turns and a steep grade leads to the summit where there is a 50-foot stone tower. From here, visitors gaze at the tremendous island world cupped between the snow-capped mountain ranges of the Olympics and the Cascades. Mount Baker looms up so big it appears to be only a stone's throw away and even mighty Mount Rainier can be seen on a clear day about 150 miles to the south.

Orcas is often referred to as the "resort island" because it has so many accommodations for tourists. Most popular with divers is West Beach Resort. It has rustic cabins at the edge of the wa-

ter, a large campground, a well-stocked store, a dock and launching ramp, and most important, an air compressor for filling tanks. Some years back, a group of divers, myself included, stayed at West Beach and discovered nearby underwater ledges where abalone and rock scallops were abundant. We provided ourselves with a fresh, gourmet seafood dinner that was even tastier than anything we could order at several fine Orcas Island restaurants noted for the excellence of their food.

We also explored Parker Reef, one of the most colorful underwater sites in the entire Puget Sound region. This extensive, rocky reef is located a half mile

north of Orcas Island. To get there we used two 16-foot boats we had trailered to the island. Both above and below the surface, the rocks and ledges of the reef appeared almost white due to their granite composition. Against such a light-colored background, the red, green, and purple sea urchins, bright blue starfish, and orange sea plumes stood out vividly. It was and is a breathtaking sight. Accustomed to more somber colors in southern Puget Sound, the reef almost seemed tropical with such intense colors. Although the sun shines more in the San Juans than on the mainland, the water is quite cold and full wet suits are always necessary. Parker Reef is now wisely designated and posted as a Wildlife Refuge so the taking of marine specimens is no longer permitted.

Another island with unusual and unique attractions is San Juan Island, the final Washington stop for west-bound ferries before they head to Sidney, British Columbia, or Vancouver Island.

The University of Washington operates a large oceanography laboratory on the eastern side of San Juan Island. The lab's main function is research but tours



Photos by Jerry Martin

are available and anyone interested in marine biology will be fascinated by the facility and its projects. Over on the west side of the island, the university also has a 200-acre biological preserve at False Bay. At low tide the bay virtually disappears and offers one of the best opportunities in all the islands to observe intertidal life.

Among divers and fishermen, the west side of San Juan Island is renowned as the habitat of large ling cod. Here Bob Kroeger speared one of the heaviest ling cod ever recorded, an 80-pounder. When Bob cleaned the huge fish, he found the distended belly held a whole octopus, confirming our suspi-

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cions that the ling cod is a predator of the octopus.

Also on the west side of San Juan Island there is a state park noted for whale watching and adjacent to it, the privately funded Whale Research Laboratory. An impressive amount of scientific information has been accumulated regarding the cetaceans of Puget Sound, particularly the killer whales. In fact, killer whale pods designated as J, K and L, which frequent the island's waters, have become the most studied family groups of cetaceans anywhere in the world. The Whale Research Laboratory is an extension of a private enterprise Whale Museum that was established 10 years ago at Friday Harbor, the county seat and largest town on San Juan Island. Among the museum's displays are a lifelike model of an infant humpback whale and a skeleton of an orca or killer whale. Exhibits include the data on the killer whale pods being studied. The museum

an exchange of complimentary banquets. Finally in 1872, the border dispute was settled by arbitrator Kaiser Wilhelm I of Germany who ruled in favor of the U.S. Both military forces were withdrawn. I suspect the troops left somewhat regretfully, having enjoyed a bountiful life among beautiful surroundings and knowing full well they were lucky to have been involved in a "peaceful war" with only one animal casualty.

Today, the English Camp comprises 529 acres nestled on the shores of picturesque and peaceful Garrison Bay. A blockhouse, barracks, and commissary have been restored and nearby there is a 300-year-old, big-leaf maple which is reputed to be the world's largest. The park is a good picnic and hiking area.

American Camp at the south end of the island covers 1,222 acres, mostly beaches and windswept grasslands where you can see rabbits, ferrets,

eagles, and a variety of smaller birds. About all that's left of the military encampment is a few earthworks and a cannon mount. The park does have spectacular marine panoramas and it's a great place for beachcombing and hiking. The one time I visited the area I was intrigued by the possibility of some day diving near the lighthouse at Cattle Point, the southern tip of San Juan Island. There are no sheltering islands nearby and the wind, waves, and tides can get nasty at times. It would have to be a carefully planned dive. But this is just one of many potential diving spots in the islands I have wanted to check out and there is no way I can get to all of them in one lifetime.

For several years now, my wife and I have become happily spoiled for a few days every September when we visit Orcas Island. We park our small but completely equipped RV behind the waterfront home of Phyllis and Ed Stone, who used to be our next-door neighbors on the mainland. Then we live off the land and sea. Through diving, fresh fish, abalone, and rock scallops become the basis of our joint family diet. Dungeness crab from Ed's crab pot and home grown vegetables and fruit right from the garden round out our tummies every evening.

After dark, we sit on the veranda of the old remodeled farmhouse and watch the red shimmering reflection of the moon on the water. Lights twinkle in the distance from a multitude of islands and a passing ferry, but they offer little competition to the thousands of stars overhead.

S

The Caldo off-loading dive gear at her home port of Anacortes.



also offers half-day wildlife cruises aboard its research boat.

At opposite ends of San Juan Island are two interesting parks which together make up the San Juan Island National Historical Park, commemorating the Pig War of 1859. The British-American Treaty of 1846 had left the International Boundary through the islands so vague that both countries claimed them and citizens of each settled on San Juan Island. When an English pig rooted up an American potato patch, it was shot and the situation immediately became very tense. Troops from both countries were sent to the island and there was much international bristling at the top levels of government. However, during the succeeding period of arbitration, the opposing camps on the island remained calm and even vied with each other in

Travel Tips

The San Juan Islands lie within what some refer to as Washington's "banana belt." Temperatures seldom drop below freezing and in summer hover around the 75-degree mark. Rain also falls much less frequently than on the mainland.

Water temperatures are a very cool 40 to 45 degrees year-round. Wet or dry suits are a must. Visibility is best during the winter months.

To date, there are no dive shops on the islands, but air refills can be had at the West Beach Resort on Orcas Island or at Mickelson's Diving & Salvage Co. at Friday Harbor on San Juan Island.

There are dive shops on the main-

land including some at Anacortes where the ferry originates. Several dive boats also operate out of Anacortes and arrangements can be made at any dive shop. Day trips run \$35 to \$45.

Divers traveling to the ferry from the north can get all the information and services they need from Bellingham Dive & Travel at 2720 W. Maplewood in Bellingham. Arriving from the south, divers will find complete services at Whidbey Divers at Oak Harbor on Whidbey Island.

During February, March and April, the Caldo operates in the San Juans. Based in Anacortes, owner Scott Fitch offers two days of diving with an overnight stay at the Islander Resort on Lopez Island for \$155 per diver and \$99 for non-divers.

S



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a 170-mile
barrier reef and
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dream.*

Uniquely Belize



At Altun Ha, visitors can see ancient Mayan temples. Divers will encounter large specimens of yellow tube sponges and may see juvenile coral crabs and spotted drum fish.

I descended the vertical coral face. The water appeared a deep blue turning black toward what seemed a bottomless void below.

At 80 feet, the massive coral structures made me feel small and insignificant. Five eagle rays came out of the gloom, gliding by only to disappear again into the blue. I felt a sense of awe, not fear.

Never before had I seen a Caribbean coral reef teeming with such a magnitude of marine life, nor would I witness

BY WALT STEARNS

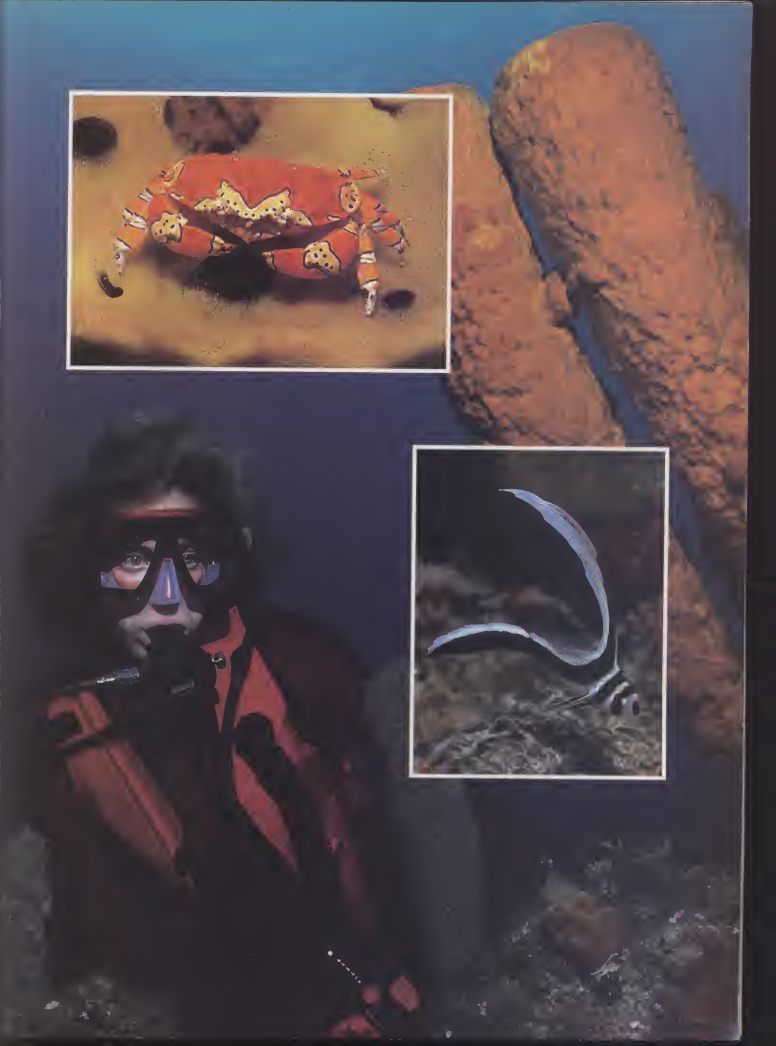
Walt Stearns, a Florida-based free-lance writer and photographer, began snorkeling at age three. He was a diver for Miami Seaquarium and is currently a PADI assistant instructor.

this again for a long time. That trip was 10 years ago in 1978. When I reflect, it almost seemed too perfect, and it is difficult to perceive the reality of the experience. I had vowed to someday return to Belize to see if it had changed. A recent trip confirmed all was still well in Belize.

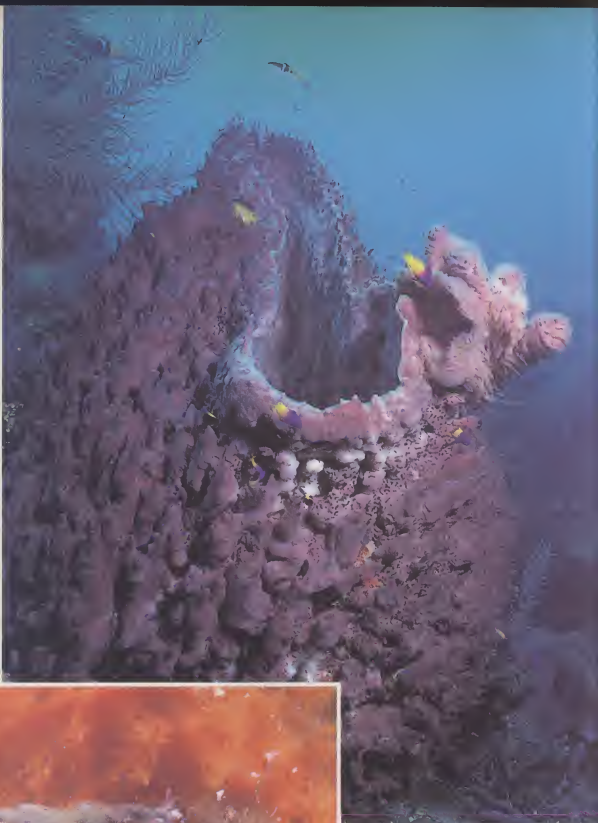
Located on the western edge of the Caribbean, just south of the Yucatan Peninsula, Belize is a small country with vast natural resources and beauty. With a dense tropical rain forest, Mayan temples, and a spectacular barrier reef, Belize also has three of the Caribbean's only true coral atolls.

The barrier reef in Belize is the longest in the western hemisphere. It virtually runs the entire length of her 175-mile coastline and is second in size only to Australia's Great Barrier Reef.

Most people envision a barrier reef as an unbroken chain of coral reefs. It is a chain of large coral formations, but one broken by deep channels between them. Inside the reef along the Belizean coastline, like jewels in a lavish necklace, are 450 jade green cays. A brilliant blue sea outlines coral dotted shallows and the white sand beaches of the small islands. The cays and everything sur-



A large barrel sponge is shown above, and a red-leg hermit crab within its shell home.



rounding them are protected by the extensive coral formations of the barrier reef only a few hundred yards from their eastern shores. Waves from the open Caribbean are reduced to mere ripples making the surface of the lagoons placid. With predominantly shallow depths from five to 25 feet, the waters are clear blue over the sand and coral bottom. The shallow coral gardens in these lagoons are alive with colorful

tropical fish and prolific coral formations that nearly touch the surface. On the seaward side, the reefs are more dramatic, gently sloping to between 25 and 45 feet before plunging to great depths. At irregular intervals, the sloping shelf is broken by deep cracks and crevices that meander to the reef's outer edge.

Belize's barrier reef has so far escaped overfishing due to the country's undeveloped economy and the inaccessibility of most of the reefs. The Belize government has shown genuine promise in efforts toward promoting tourism and protecting her natural resources by installing a number of national parks. This began in March of 1982 with the establishment of Half Moon Cay National Monument on Lighthouse Reef; the first reserve created under the National Parks System Act of 1981. The Belizean government realized what they had before it disappeared.

Lighthouse Reef, like her sister atolls, Glovers and Turneffe, represents one of the last truly unspoiled reef ecosystems in these tropical waters. To dive here, one feels a sense of remorse for much of the rest of the Caribbean. All too often we hear the phrase, "the way the Caribbean used to be" or "true virgin diving" referring to places regularly promoted for diving. We soon discover the larger predators such as grouper and snapper, once found in large numbers on the reefs, are no longer to be found. Lighthouse Reef, on the other hand, renewed my faith.

From the first days' diving around Turneffe through the six remaining days on Lighthouse Reef, we were troubled by bad weather which did a good job in reducing the visibility to 40 to 50 feet. Normally, the weather is calm with gentle trade winds blowing out of the east and temperatures in the low to mid 80's throughout the year. When the weather behaves more desirably, visibility averages 100 feet or more. On the other hand, Mother Nature doesn't always cooperate. The coral reefs' protected leeward side still provided relatively calm waters and some pleasant diving even when the winds did get a bit strong. Diving in the shallows, we found the coral formations filled with thousands of tiny tropical fish, colorful tube worms, sea fans, and large angelfish. Lettuce, fire, and elkhorn coral were the most abundant species in the shallow areas. Some of the lettuce coral beds were the size of a Cadillac. On the southeastern edge of Lighthouse Reef the coral bottom drops off into what seems to be an endless abyss adorned with clusters of long, yellow tube sponges; small, deep red cup sponges and black coral. Larger predatory fish such as horse-eye jacks, bar jacks, and snappers were quite common in this

area. Occasionally, a reef shark of an eagle ray would come into view, offering a photo opportunity.

On the southern edge of Lighthouse Reef, nearby Half Moon Cay, the coral precipice takes on a more intriguing appearance. On the inner side of the reef, the sandy bottom gently slopes to a depth of 50 to 60 feet where it is met by a great coral bastion rising to within 30 feet of the surface. To the seaward side, large crevices and tunnels with white sand bottoms cut through the reef to the outer edge where a great wall plunges downward. A favorite way to explore this coral labyrinth is to meander toward the drop-off searching for big groupers, nurse sharks, and an occasional sleeping sea turtle. Brightly colored tropical fish, crustaceans, and mollusks can also be found in these alleys. Here one can see Swiss guard and black cap basslets, butterfly fish, and blackbar soldier fish flit about near the openings of their homes in the recesses of the reef. Small,

sters lurking in the depths below. However, there are no sea monsters, unless you consider the stalactites, some of which are 20 to 30 feet long and three to five feet in diameter, and hang from the ceiling of the Blue Hole itself. This is a deep dive which is always supervised by divemasters. The tops of the stalactites are at 90 feet. At some point during the earth's geological history, possibly during the Ice Age when the world's sea level was much lower, the Blue Hole was a dry cave. Subsequently,



A pair of French angelfish cross in front of an elkhorn coral. Yellow tube sponges are shown at left.

colorful nudibranchs, hermit crabs, and banded coral shrimp catch the macrophotographer's eye. Huge schools of purple wrasses constantly flow by, adding to the magic of the entire dive.

One of the big thrills of exploring Lighthouse Reef is to dive the Great Blue Hole. This immense underwater cavern some 400 feet deep and a little over 100 yards in diameter tantalizes the imagination with visions of sea mon-

sters lurking in the depths below. Exploring the rim of the Blue Hole is an excellent dive. Unlike its inner depths, the rim at 30 feet, holds a cornucopia of marine life. In the shallows surrounding the Blue Hole, Christmas tree worms, fan worms, and colonial tube worms can be found in every hue possible as well as sea fans in shades of green and deep purple.

There are dozens of dive sites at Light-house Reef, and even more, too numerous to count, which have yet to be discovered. And diving is not the only thing that should be experienced in Belize. Deep within the country's interior you can explore ancient Mayan temples like Altun Ha and Xunantunich. Recent discoveries indicate Belize played a major part in the Mayan civilization. A jade head, the largest single jade carving found in the Americas was excavated at the Altun Ha ruins. In addition to Altun Ha and Xunantunich, excavations are now taking place at Lamanai and more newly discovered sites. Most of the archaeology sites are accessible by car. Visits can be arranged through dive operations in Belize. **\$**

A pair of nudibranchs.



Travel Tips

Government

Belize, formerly British Honduras, was a British colony until gaining full independence in 1981. It is a democratic country free of terrorism or local insurgence. Belize is definitely not a Central American country with serious political problems. It is, however, an economically poor country which will be apparent the minute you arrive in Belize City. With the country's abundant natural resources and potential for tourism, the Belizean government is making improvements.

Dive Operations

To extensively explore the barrier reef and three atolls a live-aboard dive boat is the way to go. I selected the Sea Aggressor, one of three live-aboards operating in Belize. The others are the Isle Mia and the La Strega. A typical dive package for one week includes unlimited diving within the limits of the sport diving, three meals a day, and a twin berth cabin which you may share with a stranger if you don't have a traveling companion. Prices range from \$995 to \$1,195 per person, tax and airfare not included. A 15 percent gratuity is generally expected at the end of the trip.

There are also several resorts on some of the cays that are well equipped to cater to divers, fishermen, or anyone who wants to escape from the modern world for a time. If you are looking for a resort with tennis courts and swimming pools, they are not to be found. However, what you will find are coral reefs within swimming distance of shore.

Ambergris, on the northern end of the barrier reef, is the most developed cay for diving and fishing. It has numerous small resorts with thatched roof bars and individual bungalows set along white sand beaches. Unlike Ambergris Cay, St. George's Lodge located on St. George's Cay, eight miles away from the nearest commercial establishment offers a more secluded retreat for divers right on the barrier reef. Outfitted with a full line

of SCUBAPRO equipment, four dive boats, three compressors and over 100 tanks, the Lodge is well equipped to handle divers in this remote location. Besides the usual assortment of marine life commonly found around the reefs, manatees also live in the waters adjacent to St. George's Lodge—an extraordinary find in itself.

Entry and Customs

A valid passport is required to enter Belize. Other forms of identification are not necessary. The Belizean dollar has an easy exchange of \$1 U.S. to \$2 Belize. VISA and Mastercard are honored at some resorts and restaurants. Check with your travel agent.

English is the official language and is widely spoken throughout the country. Spanish is a strong second.


Temperatures are in the 80's year-round, sometimes getting into the 90's during the summer months. Water temperatures range from the high 70's to the low 80's year-round.

Getting There

Taca or Tan/Sasha International Airlines have direct non-stop flights from Miami, Houston, and New Orleans to Belize City. When planning your trip, it is a good idea to be at the ticket counter two hours before departure time or you run the risk of being bumped off your flight, regardless of confirmed reservations. A round-trip coach fare to Belize costs \$245. There is no entry fee, but there is \$10 per person departure tax collected at the airport. Once in Belize, ground transportation is provided by your live-aboard dive boat or resort to take you to your destination.

For further information contact: Belize Promotions, 720 Worthshire, Houston, TX 77008, 713-869-3614, See & Sea Travel Service, Inc., 50 Francisco St., Suite 205, San Francisco, CA 94133, 415-771-0077, or The Belize Connection, 16730 El Camino Real, Houston, TX 77062, 800-331-2458. **\$**

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*New Hampshire's
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Diver inspects the stern of the Lady of the Lake.

Mountain Lake Shipwrecks

While many divers dream of exploring shipwrecks in the pristine waters of the Caribbean, others are enjoying dives on sunken vessels in fresh-water lakes much closer to home. The northeastern section of the United States, with its long commercial history is a virtual storehouse of early vessels scuttled or sunk over the years. The clear, cold water of Lake Winnepesaukee in New Hampshire offers wrecks of steamboats, horse boats, steam barges, yachts, and even railroad cars. It is an underwater adventure in history for visiting scuba divers.

BY RUSS BELLICO

Russ Bellico is a professor of economics at Westfield State College in Westfield, Mass., and has written many articles on diving and the history of New England.



"Beautiful Water in a High Place" is the Indian translation for Winnepesaukee. The water of the clear lake is drinkable water (class B). The lake boasts 183 miles of shoreline and 274 islands. It is 28 miles across, making it the largest natural lake in the United States lying within one state's border. Formed by the melting waters of Ice Age glaciers, Lake Winnepesaukee reaches depths of 187 feet.

The town of Wolfeboro at the southeast end of the lake became America's first inland resort community in 1768. Today, Winnepesaukee, linked by Interstate 93 to the northeast corridor, remains one of the most popular resort areas in the country. There are numerous beaches on the lake including Weirs Beach with its boardwalk, arcades, restaurants, gift shops, waterslide, night clubs, and motels.

Weirs Beach, recognized as the historic center of the lake, has public docks and three large cruise ships including

do upon arriving at the lake is purchase the navigation chart of the lake from a marina or gift store. As the lake has many long bays, large islands, and communities, the chart is a must to avoid getting lost. The 1987-88 Navigation Chart shows 19 wreck locations, many indicating the length of the vessels and their depth. However, wreck locations on the map are, in some cases, not exact requiring further directions to pinpoint them.

Despite considerable development along the lakeshore, the visibility is still reasonably good reaching 25 feet in most of the lake. However, Paugus Bay, where a number of wrecks lie, has slightly lower visibility. The surface water temperature during the summer reaches 72 degrees, dropping to the 60-degree range at 30 feet, and into the low 50's below 50 feet.

The first steamer to ply the lake was the *Belnap*. She also became the first casualty. The steamboat era began in

1823 when a group of investors obtained a monopoly privilege from the state government at Concord to operate steamboats for 20 years on Lake Winnepesaukee. However, it wasn't until 1833 that the first successful steamer was actually launched on the lake. A large, festive crowd of area residents gathered to see the 96-foot *Belnap*, powered by a sawmill steam engine, splash into the water. She made regular runs between Center Harbor and Alton Bay for nine years. During the nineteenth century, steamboats were the most economical method of delivering bulk commodities such as wood. It was the wood-burning age and

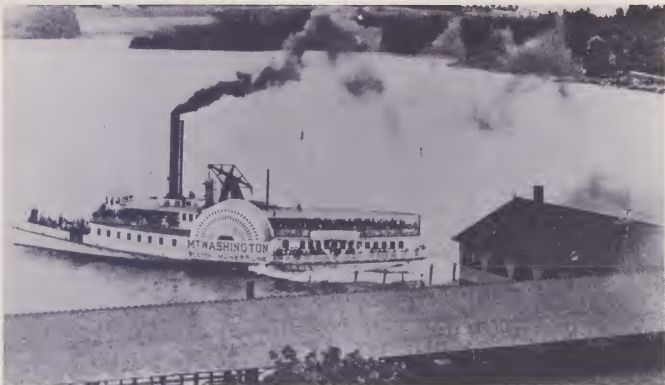


An aerial view of Lake Winnepesaukee shows its many islands. The Governor Endicott, right, and the Lady of the Lake during their active years of serving the lake.

the 1,250 passenger, *Mount Washington II*. The *Mount* itself is an interesting relic beginning its career as the 205-foot steamboat *Chateaugay* in 1888 on Lake Champlain. Summer events in the area include concerts, an antique boat show, fireworks every Sunday, the "Miss Winnepesaukee" contest, and many others. Along the lake the port communities of Meredith, Center Harbor, Wolfeboro, Alton, Glendale, and Moultonboro offer public boat launching facilities as well as an excellent variety of accommodations, campgrounds, shops and restaurants.

The first thing a visiting diver should





The Mt. Washington departs from Weirs Beach.

wood had to be delivered to populated sections of the lake. In 1841, while towing a raft of logs, a sudden storm literally blew the *Belnap* into the sharp rocks of a small island where she sank. The island has been named Steamboat Island since, and the main remnants of the ship's hull lie right off the northwest side of the tiny island on a sand bottom in very clear water. The engine was removed, but quite a few sections of the broken hull are scattered over the sand and rocks. It's an excellent wreck for family snorkeling and would be a good wreck dive for novice scuba divers as the depth range is only 15 to 20 feet. The *Belnap* is most easily found by snorkeling close to shore near the bridge connecting Birch and Steamboat islands. Although there is a piece of the *Belnap*

in deeper water, the current lake chart's location of the main wreckage is somewhat misleading.

One of the best wrecks in the lake is the steamer *Lady of the Lake*. By 1848, many local residents had been seized with "steamboat fever," and the Winnepesaukee Steamboat Company was formed. The 400-passenger steamer with a length of 125 feet and a 35-foot beam was launched the following year. She was the first new steamer on the lake with a custom made engine and boilers. The *Lady of the Lake* plied the lake for the next 44 years carrying both freight and passengers. She was the first steamer to connect the major towns and railroad stations on the lake which opened the whole region to the tourist trade. Retired in 1893, the *Lady* served

as a boarding house in Glendale Cove until her superstructure was removed.

In 1895, orders were given to tow the retired and dismantled *Lady* to deep water and sink her near Rattlesnake Island. As two boats tried to tow her out of Glendale Cove, the old steamer suddenly rebelled, lurched uncontrollably, and sank right in the cove. She sits upright today, with her hull completely intact in 32 feet of water between Pig Island and the Glendale shore. Ironically, she continues to entertain diving tourists at the bottom of the lake. She is also home for large numbers of perch and bass.

The *Lady's* deck is largely intact except for a portion of her stern where her exposed beams radiate in a mosaic pattern. Divers can penetrate her huge, empty engine compartment and carefully swim forward to exit through the two front hatches on her deck. Large rocks placed in the hull in 1895 to aid in her sinking can make for a tight squeeze. The hull is remarkably preserved as it looms ominously on the bottom of the harbor. The *Lady* was one of the first relatively intact wrecks I had ever seen in my first years of diving and I still remember the excitement as the massive form of the vessel took shape. She is probably the best preserved mid-nineteenth century steamboat hull in the country.

The *Lady of the Lake* may take some patience to find. First, make sure you have picked the right island before beginning your search. Although the map



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shows the wreckage in the middle of the channel, it is actually a little closer to Pig Island. A few white plastic detergent bottles are tied to the vessel and float within six feet of the surface to help divers find the wreck. Finding the detergent bottles can be tricky, but it is better than wasting your air supply by diving in the wrong place.

One mystery involves the final location of the burned hull of the *Mount Washington*. Built by the Boston and Maine Railroad to compete with the *Lady of the Lake*, the *Mount Washington* had a length of 178 feet and a beam of 49 feet with a 450-horsepower engine. Launched in 1872, she was the lake's largest and most luxurious steamer to date. In 1939, after 67 successful years of service, the *Mount Washington* was still in service on Lake Winnepesaukee. In December of that year, she was moored to the dock at Weirs for repairs. A stove overheated in the nearby railroad station and set fire to a complex of buildings, a seaplane, and the *Mount*. She burned to the waterline since it was impossible to move the ship away from the fire because low water had grounded the *Mount* at her bow. A few items were salvaged including an elaborately carved paddlewheel box which is on display at the Mystic Seaport Museum in Mystic, Connecticut. Today, the spot where the *Mount* burned at the Weir's dock still yields parts of the ship left from the disaster. The remains of the hull were supposedly towed out of the harbor after the fire and sunk in deep water. Eyewitness accounts of the hull's final resting place vary—some say it went down off Rattlesnake Island, but others suggest different locations. There is speculation the vessel may have been entirely carted away. The main wreckage has never been found by divers although a few portholes were discovered, but there is some evidence they came from another wreck. There has never been a major search for the vessel.

In 1905, the Winnepesaukee Transpor-

tation Company launched the double-decked 100-foot steamboat *Governor Endicott* at Lakeport on Pausug Bay. The small steamer with a 19-foot beam did a considerable excursion business on the lake for many years. In 1919, the steamer was sold to Capt. Leander Lavallee who in turn sold it to his son who operated the vessel until 1927. The *Endicott* was again sold, but served only a few more years before being partially dismantled. In the late 1930's, the steamboat was scuttled by Capt. Edward Lavallee at the southern end of Pausug Bay.

Today the hull is completely intact about 22 feet below the surface. The deck has separated from the hull and lies behind it. Some of the machinery from the vessel is apparently at the site. Unfortunately, for the present, the wreck is strictly off limits to divers since it lies in the waterworks section of the lake. Violators will be arrested and fined for entering the water supply area. Last season several divers were caught at the site. There has been a move to have the steamer pulled out of the restricted area. Although unsuccessful to date, if this ever occurs it would make a great wreck for the diving public. A change in future sources of water for the region would also make the wreck available.

There are a few other steamboats in the lake. The *Seneca*, built at Melvin Village in the 1860's, had a short career. The small steamer smashed on the huge Goose Egg Rock in Moultonborough Bay and floundered during a fierce windstorm. The engine and boiler were removed from the wreck, but the hull was abandoned. Today, the sparse remains of the vessel are in the shallow water north of the Goose Egg Rock in Moultonborough Bay.

Another small steamer lies in the shallow water of Wolfeboro Bay. The badly damaged vessel has not been identified to date. Little has been recorded on the demise of the smaller steamboats. Although a few of the following ships burned, the final disposition of the *Maia*

of the Isles, *Winnepesaukee*, *Belle of the Wave*, *Chucorua*, *James Bell*, *Moultonboro*, *Eagle*, *Lamprey*, and *Mincola* is yet to be fully documented.

One of the interesting wrecks discovered in recent years is an intact steam barge off Weirs Beach. The vessel, lying at 45 feet, is filled with massive iron machinery including a large iron winch, boiler, stove, and other unidentified equipment. A long, wooden section protrudes from the bow with high, vertical beams that were probably used for pile driving. Hefty iron wheels of a winch mechanism offer great photo possibilities. Three Clorox bottles and a five-gallon white jug are tied to the wreck and float within six feet of the surface. By going north of Weirs Beach passing both the black buoy and the Lakeside Motel you will see a huge yellow house. Approximately 300 or 400 feet out from the house and dock lies the wreck. It can be tricky to spot the bottles, since you will have to judge distances while snorkeling to look for them.

A short distance from Weirs in Maiden Lady Cove (Meredith Bay) lie the remains of a Boston and Maine train that derailed on the curve and plunged into the lake. The locomotive was salvaged, but several flatcars and boxcars remain on the bottom. One flatcar lies in only 12 feet of water while an intact boxcar sits in 42 feet. One story has the train sinking around World War I carrying a load of copper ingots, while other accounts suggest the early 1940's as the date of the accident.

There are several vessels in Pausug Bay south of Weirs Beach. Three large wooden barges that were sunk during the 1938 hurricane lie off the western shore of the bay. The 1987-88 Navigation Chart locations of these wrecks are slightly misleading. They are a little farther south of the shore adjacent to Pickerel Cove. Old landmarks that once identified their location are gone today due to development along the shore. One barge is only 40 or 50 feet from

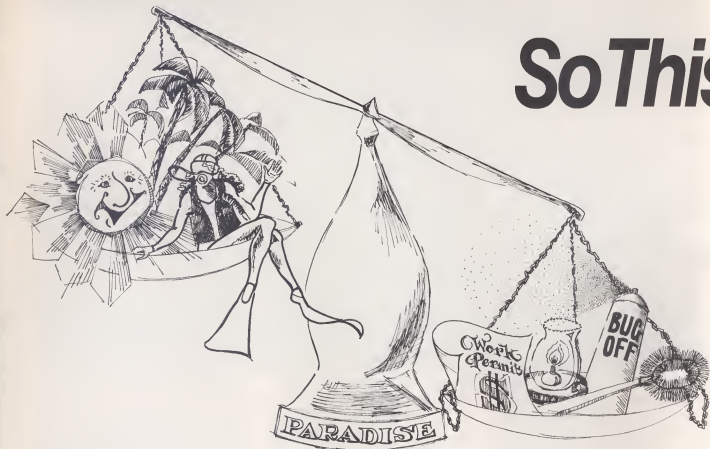
(Please turn to page 78)



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So This



Illustrations by Laurie K. Doyle

When the alarm shatters the early morning stillness, Courtney Platt rolls out of bed and heads to work—800 feet beneath the sea. The 29-year-old California native earns his daily bread by piloting a tourist submarine down the coral walls of Grand Cayman. On occasion, he has escorted the likes of cinematographer Stan Waterman, shark authority Eugenie Clark and *National Geographic* photographer Emory Kristoff.

Across the water on Little Cayman, Donna Ingle's job as a receptionist/bookkeeper at a dive resort might involve "everything from cleaning toilets to driving nails, to washing dishes and cleaning up behind a gourmet chef." Her divemaster husband, Paul, takes care of all maintenance. It's not glamorous, nor is the pay good. In fact, the young couple only earns about U.S. \$1,000 a month between them—well below minimum wage, even if they could keep their

hours down to 40 a week. Still, the two Texans have no plans to pack their bags and head back to the States.

A dive instructor known as Toad once left his dream job as divemaster on a live-aboard to make his fortune in the "real world." The Ohio native is now happily back to hoisting sails and stowing all his worldly possessions in a duffel bag.

"I don't know how I'd live with myself if I didn't give myself this chance," says Toad. His job affords him the opportunity to dive several times a week at a variety of sites throughout the Bahamas. Like Donna Ingle, he's also cleaned more than his share of toilets. But to Toad, it's a small price to pay to live in paradise.

These adventurers are following in some pretty illustrious footsteps. Fletcher Christian loved the South Pacific islands so much, he led a mutiny when the captain of the *Bounty* tried to leave. In the 19th century, French painter Paul Gauguin found paradise in Tahiti. "Papa" Hemingway bid good-bye to Ketchum, Idaho, for a while to fish for stories in Bimini and the Florida Keys.

They left the security of the mainland to make a tropical island their home. And with the growth of the dive travel industry, more and more people are following in their footsteps. Places once the realm of bohemian artists, writers and renegades are becoming a haven for former grocery clerks, nurses, executives and many others who want to live, work and dive in the Caribbean.

The question that haunts those of us anchored to the mainland remains, "Is life in Paradise really as sunny as it seems?"

Sun, Sea and Space

Platt, a dive instructor with a bachelor's degree in physical education, was interested in underwater photography. Cayman seemed the place to be, so he landed a job as divemaster for Bob Soto's Diving and later captained a glass-bottom tour boat. That was in spring of 1983, and he's as enthusiastic today as the day he arrived.

"It was obvious that both work and photo subjects would be optimum here," he relates. "I was right."

Adjustment was easy, Platt says. He arrived in Cayman with \$2,000

BY CATHIE CUSH

Cathie Cush is a free-lance writer based in Pennsylvania. She has contributed to many diving publications.

is Paradise...

U.S. in his pocket, which converted to only \$1,600 Cayman. Part of that went toward a moped. His employer helped arrange temporary housing until Platt found a roommate among the other divemasters. He also had to pay \$300 for an annual work permit. The fee was picked up by his employer after the first year.

"I expected six-day work weeks, long days, lots of in-water time with inexperienced divers and lots of resort courses for *minimal* pay—all true. I didn't expect Burger King, nine grocery stores, a five-day work week after two years and lots of tips on the glass bottom boat, satellite TV and videotape stores, a telephone, microwave oven, and auto repair services."

Of course, Platt picked one of the Caribbean's most civilized islands. Little Cayman is only a few miles across the water, but light-years away in terms of conveniences.

"Life on a remote island is definitely a step backwards as far as the comforts of civilization are concerned," according to Donna Ingle. "Only a handful of people here have generators for electricity, the rest use kerosene lanterns. And everyone depends on rain for fresh water. There

is no food grown here, except what comes from the sea. The rest is imported from the States. Most cargo is first delivered to Grand Cayman, then Cayman Brac and finally to our island. The cost has sometimes tripled by the time it reaches here, and then the quality is never guaranteed!"

"This life is not for everyone," she continues. "It takes a special nature to endure mosquito season, rough weather and grumbling guests. The average stay of a divemaster on this island is six months."

Asked what she missed most, Donna responded, "I guess good, cold, fresh milk rates up there with hot baths." The island's cold showers took some getting used to, she con-

forward and two steps back." Home schooling of the couple's eight-year-old daughter has been another challenge, but one that has "worked out nicely."

Says one six-year island veteran, who asked to be anonymous, "I think I expected to love the sun and stay tan. As it turns out, I avoid it as much as possible. I am not very tan, and love rainy days. I guess I expected to get away from the 'obnoxious-type' tourists by choosing remote areas like Mexico's Yucatan and the British Virgin Islands. I expected 'travelers', but most Americans expect underdeveloped places to have all the luxuries they're accustomed to anyhow and can be pretty obnox-

"Down to the Banana Republic, down to the tropical sun go the expatriated Americans hoping to find some fun"

Steve Goodman, Steve Burgh, Jim Bothlin

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fesses. "I'm one of those soak in a tub filled to the brim with hot water people."

None of the above was meant to discredit Little Cayman. Virtually nothing could lure Ingle back to the hustle and bustle of the States, she says. Both the island and the job have a lot to offer. But, like most of those who adapt successfully to living on an island, Ingle has developed a realistic attitude about what the lifestyle involves. Tremendous diving, idyllic weather and interesting new faces each week are just one side of the proverbial coin. On the other, island living is no vacation.

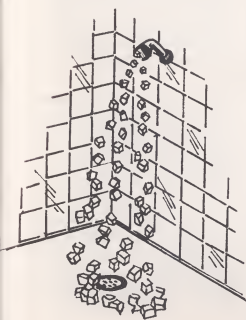
"The climate is what I expected, but I never dreamed there could be so much physical labor involved in maintaining a small resort," Ingle confides. "It seems we take one step

ious. I expected to travel and see lots of surrounding areas, but long hours and low pay don't allow too much local travel.

Surprisingly, sometimes the nature of the job doesn't even allow much diving. For example, when Toad returned to the ship, he opted for a deckhand's position instead of the divemaster's spot. Now he gets to dive more often.

"I usually dive four or five times a week," he says. "When I was a divemaster, I did maybe one if I was lucky. It just didn't fit in with the scheme of things." His most difficult adjustment as a divemaster, he continues, "was dealing with divers I hadn't trained or who hadn't been trained by the ones who trained me."

Other divemasters echo Toad's sentiments. The weight of responsibility is often more taxing than the lack of



conveniences. Platt says he watched a lot of divemasters burn out on "tourists bent on killing themselves while under your supervision."

Red Tape and Red Alerts

While divemasters spend a major portion of their time ensuring that vacationing divers have a safe trip, they find dealing with their own medical problems can be a major hassle. A first mate on a live-aboard shudders as she remembers being airlifted out of the Bahamas to receive emergency medical care. Dive guide and author Dee Scarr agrees. I needed complicated root canal work. The dentist on Bonaire couldn't even touch it." She had to fly stateside for treatment.

And there are other adjustments that expatriates often have to make. "On Bonaire, my main problem is reading official memos from the government, insurance agents, etc., which are in the Dutch language," Scarr writes.



A multi-lingual resort operator living in Haiti adds, "If paradise speaks with forked tongue, it's essential to at least have rudimentary language skills in local patois!"

There are job problems, as anywhere, plus storms of red tape and other factors workers are less likely to encounter statewide. Sometimes the little irritations are enough to make one think about packing it in and going home—almost.

"Little frustrations that sometimes build to a peak are power outages, unbelievably bad driving habits with absolute disregard for others (stopping in intersections or middle of main roads to talk or pick up friends), some (only a few) locals' attitudes toward the white minority, increasing crime rate," Susan Leferon writes from St. Thomas. A 41-year-old native of Stamford, Conn., she manages a dive shop full-time and serves as a part-time pilot for a small airline. "Understand that although this is a U.S. territory, in many ways it is a foreign country ..."



Picture Yourself in Paradise

So you're convinced you have the flexibility and adaptability it takes to find your niche in an island community. You have a divemaster or instructor rating and a little experience under your weight belt. You think you can handle long hours, low pay and smiling at tourists even on rainy days. Your gear bag is packed and ready to go. What next?

Many expatriates found their jobs through friends; others found positions through the certifying agency networks. Platt met Ron Kipp at a NAUI function and asked for a job on the spot. Platt had been a passenger on a Blackbeard's cruise, so he knew something of what to expect before he wrote seeking a job. He was asked to start immediately.

Landing a resort job is much like landing any other. Sometimes it's a matter of connections, sometimes it takes sending out resumes to resorts listed in dive publications.

In many cases, the employer will help arrange housing, at least temporarily. Some bosses even make transportation available for times when employees need it, although many said they got along just fine with a bicycle most of the time. Purchasing a car on the island is one option, as is bringing a vehicle from the mainland. The latter can be surprisingly expensive, especially if the car is new. Not only must the car be shipped from Texas or Florida at a cost of several hundred dollars, but most islands will charge an import duty ranging from 25 to 400 percent of the car's declared value.

In most countries, expatriates need a work permit. What it costs varies from virtually nothing on Bonaire to \$1,500 in the Turks and Caicos.

"I've been a wetback for years, it seems," writes one expatriate who has worked as a dive instructor all over the world. A special work permit is necessary in Mexico, "and I was unable to get it. It would have cost \$1,000 U.S. each year with government connections. Without—forget it. Still working on getting the permit in the British Virgin Islands. I guess it's about \$500. Haven't been able to get through the complicated paperwork yet. Currently I must leave the country once a month, at my own expense."

Resort owner Alan Baskin wrote, "Now that I have moved to the British Virgin Islands, I find for the first time that I must have a work permit." It costs \$300, he says. No such fees were necessary in Haiti or Grenada, he adds.

The work permit fee seems to be a negotiable part of the work contract. Sometimes the employer pays it; sometimes the employee pays it. In many cases, the employer will pick it up after the first year. For those who come to the islands with a guaranteed job, immigration seems to be very little hassle, and renewal is not usually a problem. However, some workers can create problems for themselves.

Dee Scarr notes that on Bonaire, "those who blatantly violate work permit provisions have been escorted to the airport by Immigration!" Platt says he has seen permits denied in the Caymans, where immigration is very strict. There, adds Ingle, an employer must advertise an open position for three weeks to make sure a qualified Caymanian is not available for the job. "The government also scrutinizes records of individuals (drugs are taboo here) and requires there be references reflecting good moral character," she writes. "We came without knowing whether or not a work permit would be granted."

You Can't Get There From Here

The place with the palm trees, warm breezes and spectacular reefs is only a plane ticket, and perhaps a work permit away. But Paradise? That's much harder to find, these wanderers say.

"Do not think a different place (paradise) will solve your problems," warns Gigi Duryea, a German-born U.S. citizen who owns and manages Kaliko Dive Center in Haiti. The 42-year-old first came to the American Embassy on the island with her husband in 1982. She returned in 1985 with no job, but some connections.

She planned to stay a year if it worked, but now will stay indefinitely. This world traveler's advice to would-be expatriates: "Most of the time your problems will be more crystallized far away from home. Usually newcomers last less than three months. They're too worried about their own needs and wants and well-being to adjust. Lots of tolerance needed and lots of understanding. And maybe a lot of love for others plus strength, self reliance, outward focus, and the ability to give a lot more than to receive."

"Be sure you like yourself before trying it," counsels Fred Good, a 44-year-old Pennsylvania native who has lived in Belize since 1972. "The 'answer' isn't here, it's inside the individual." The resort owner adds, "You make your own paradise."

On the practical side, Scarr gives this advice: "Have at least an instructor rating as work permits are difficult to impossible to get without it. Acquire as many skills as you can (fiberglassing, engine repair, painting, and instructor specialties, are all helpful)."

If you've got any urge at all, "I'd say do it, but don't burn all your bridges," Toad adds. Most of his fellow expatriates agree. A work permit might be denied, the lifestyle might not suit, the job just might not work out. Most say it takes at least a year to decide whether you'll want to stay indefinitely.

Alan Baskin has some other thoughts. "Cut all of your bridges, making the move a total commitment," he writes from his vantage point in the Virgin Islands. He adds, "Actually, I think everyone should continue doing what they are doing. If everyone, or a goodly number of people decide to do this trip, all of us already in paradise are going to be in deep trouble because there will be fewer people up there to keep all the wheels moving."

Author's Note: I wish I could say I traveled to each island mentioned in this article to interview every person quoted. Instead, I had to use a variety of methods to gather the information. Some of the people were interviewed in person; others participated in a 16-question survey sent to dive shops and resorts throughout the Caribbean, the Pacific and Australia. Of 60-plus surveys mailed, more than two dozen responses were received—all from the Caribbean. Every one offered different insights into island life—far more than I could fit in this article. I'd like to thank everyone for their time and thoughts.

\$

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Taking Your Best Shot



A diver grabs the tail of an angel shark at 100 feet. Mia Tegner, opposite, floats above the engine room of the Aida in the Red Sea. Lower strobe power was used to avoid washing out the silver sweepers.

It's happened to everyone involved in underwater photography. We make a deep dive on a fabulous wreck in an exotic location, and shoot a roll of film we swear is going to knock the socks off the folks back home. But when it comes back from the lab, we don't even want to claim it as our work. Those "sensational" wide-angle shots are out of focus, underexposed, backscattered, or generally so lousy and uninteresting, we wonder why we bothered shooting the scene at all.

To maintain our fragile egos, we need to rationalize our failure. The most ob-

BY ERIC HANAUER

Eric Hanauer is an associate professor of physical education at California State University, Fullerton. His articles and photographs appear regularly in major diving publications.

vious excuse is nitrogen narcosis which some divers can experience as shallow as 50 feet and seems to rob our brain of about one IQ point for every foot beyond. But it's more complex than that, as we're not talking about depths beyond the limit of safe diving which is 100 feet.

When shooting pictures at depth, four major factors are working against us, especially when shooting with a wide-angle lens. In addition to that touch of narcosis, they are: lower light levels, less time, and safety considerations. Although the success ratio of deep-water photos will never equal that of shallow water, controlling these four factors will result in a marked improvement in the number of acceptable shots.

First, it is necessary to define deep photography. In this discussion, "deep" refers to the fringe of the diver's comfort zone. For one diver, 60 feet may be considered deep; for another, 120 could still be within his safe limit. The comfort zone will vary on different days, and under different conditions. When visibility is 10 feet in dark water, 60 feet is deep even for the seasoned diver. With experience at depth, this comfort zone can be extended within the limits of safety and the dive tables. But it isn't wise to take a camera beyond the limits of your personal zone. When concentrating on the depth of the dive, you can't apply the attention needed for photography.

The best way to extend your comfort zone is to do lots of deeper diving without a camera. Just relax and have fun at first, without the added pressure of trying to take photos. Only when you are completely at ease in deeper water are you ready to shoot pictures there.

Following are separate explanations of each of the four factors affecting photography at depth.

Lower Light Levels

Even in tropical waters, light levels begin to drop off significantly at 60 feet. In temperate water of poor visibility, readings of $f:2$ are not uncommon even with ISO 100 film. The key to effective wide-angle photography is balancing strobe and ambient light. This becomes more difficult in dark waters.

Less Time

Actual bottom time is reduced as depth increases, and the diver's perception of time accelerates. Consequently, the individual feels pressured to shoot film quickly and doesn't take the time necessary to plan each photograph. The effects of nitrogen narcosis intensify this problem.

Nitrogen Narcosis

The effects of narcosis are subtle. Just as a motorist who has had two drinks is slightly impaired and doesn't realize it, the diver influenced by nitrogen narcosis loses enough fine judgment and coordination to affect photography. Errors in perception of distance and improper aiming of the strobe are common results of a slight touch of narcosis. This can result in pictures that are too dark, foregrounds that are washed out, backscatter, poor composition, and corresponding difficulties that ruin photographs.

Safety

It isn't uncommon for a diver to exceed planned depths and bottom times, either consciously or unconsciously, because of concentration on photography.

Now let's examine possible solutions for each problem. Some are obvious, some more subtle. But by applying them, your photo success ratio is bound to improve.

If there is less light, an obvious solution is to shoot faster film. Many photographers are reluctant to try this, hanging on to the old assumption that magazine editors insist on Kodachrome. But just look around a bit. Even *National Geographic* is publishing a lot of grainy photos these days, obviously taken with 400 film, some of it even push processed. If the choice is a grainy image with fast film or no image at all, most editors will accept the grain. Some even think it lends a more interesting atmosphere to the picture.

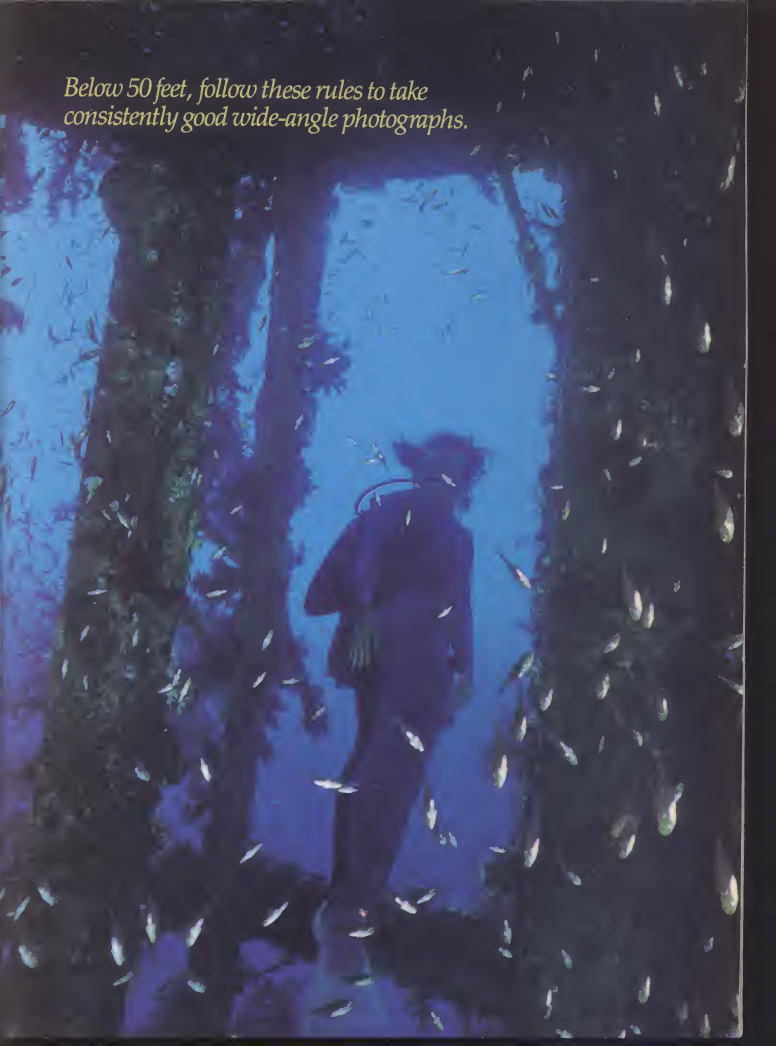
An easy way to double the effective speed of any film is to shoot at 1/30 second. This gives the film more time to gather available light, making a 100 emulsion the equivalent of 200. A 15mm lens is easily hand held at 1/30, even 1/15 if your shutter will operate that slowly. Just remember to assume a stable position and squeeze the shutter release, don't jerk it.

Even with your shutter set at 1/30, the strobe stops action at 1/1000 second. Ghost images can be avoided by keeping bright, fast moving objects farther away from the camera. Use ambient light to the maximum by shooting at an upward angle and silhouetting large shapes. The surface is a giant soft light source even in deep water. Take advantage of it. Remember, the most successful wide-angle shots are those that rely on ambient light, and utilize the strobe only to add a touch of color.

One key to doing this right is proper metering. A scene shot at an upward angle can have an exposure range from $f:16$ to $f:2$, depending on where you

(Please turn to page 76)

Below 50 feet, follow these rules to take consistently good wide-angle photographs.



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TBM-30/30	69.5	High - 4:1; Low 1.4:1	5	Mono 30/1100*; 50/600*
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TLD-10	17.0	4.2:1	4	14/450; 17/370; 20/300; 25/250
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If Australia were a fist, Cape York would be the thumb crooked toward Papua, New Guinea. And the Great Barrier Reef, the thousand-mile-long chain of coral wrapped around the coast, would be the brass knuckles bent on taking ships to the bottom.

Among mariners, the Reef is a dreaded Minotaur's maze. Countless vessels have taken fatal blows navigating the shoal-studded waters, including one rum runner carrying 14,000 bottles of premium Scottish whisky that fell short of land in 1887. I know this because a couple of Aussie divers recently stumbled onto the wooden wreckage and brought up a selection of the vintage bottles, unfortunately reporting them "barely drinkable."

Ninety percent of the reef has yet to be explored, with untold ghost ships, untouched for centuries, patiently waiting for a diver's first touch. Campbell, my dive buddy, and I decided to have a look. We boarded *Si Bon*, a 78-foot custom cruising yacht outfitted for divers, leaving Port Douglas once a week.

I came up early the first morning to greet dawn on the deck and found Hermie, our barrel-chested divemaster, filling tanks. Syrupy clouds ran down the sky and washed into the sea at the horizon, coloring the entire ocean a cold gray. I was about to complain when a fin cut in, breaking the surface of the water, followed by what seemed like miles of steel-gray body.

"What was that?" I whispered. "Hell-if-I-know," Hermie returned. We took one look at each other, grabbed our masks, and without a word leaped overboard. Motionless, scarcely breathing, we waited for the great gray shadow to return. It did.

Appearing like an apparition, moving without motion, came the whale, the most graceful of all sea creatures. This was a minke whale and it approached to within arm's reach, rocked its eye once, and disappeared. For two hours we watched and were watched. I never really saw it coming. One minute I could be staring hard into the water, and



BY ROBERT MCQUILKIN

Robert McQuilkin is an award winning photojournalist whose credits include the New York Times, Outside, Popular Photography, Saturday Evening Post, Stern, Forbes, Ski, and Backpacker. He is the author of six books and currently teaching photography at the University of Chicago.

then it would be there, filling the corners of my mask. It paused in front of me once, eye to eye. I fired my strobe and it blinked without moving. Campbell, swimming alongside it, rolled to the side once and the whale responded, duplicating the quarter-turn perfectly.

Unfortunately, Hermie's dive calendar

Diver attempts to hide food from a large potato cod, but small fish knows just where it is. An Aborigine youth prepares for a ceremonial dance. The *Si Bon* at anchor off Lizard Island.

*Only a fraction of Australia's fabled reef
has been explored by divers yet it is
one of the world's premier dive destinations.*



Excursion Down Under



had failed to schedule whaling, and before long he was spouting. I shouted back from the water that I didn't know how I was supposed to film this thing under such cloud cover. "I see," Hermie retorted, "I come down early this morning to call up a whale for you, and now you want me to speak to the sun."

Grudgingly, we pulled anchor and headed north. I scanned the navigation charts—Escape Reef, Destruction, Tribulation, Murdering, Viper, No Name. I glanced up at Ron, our captain. A sober fellow, he was concentrating, making short, quick changes on the wheel.

Four other divers on board were all ex-

perienced. Ian Wilson, a curly-haired carpenter from Bunbury, Western Australia, wanted to see a shark and would have traded any sighting—including a whale—for the chance. It was not to be, though ironically on one occasion a sizable shark passed right by him, peeled off like a jet fighter, attacked a small fish and swallowed it on the wing. It was one of our last dives and when I told him what had happened, he said he wished I hadn't.

Escape Reef loomed off the bow, glowing like phosphorescence in the deep blue of the sea. Asho and Nishesh, a couple in search of the cosmic dive, had been suited up since breakfast. By accident, Hermie called Nishesh "Hashish." The Freudian slur stuck, although Hashish argued he preferred reefs to reefer. He came back from the first dive reporting two sharks. Ian looked disgusted. Fresh pineapple, oranges, kiwi, cantaloupe, grapes, shrimp, cheese, cashews, awaited our return from the deep. The elegant spread vanished like piranha feed.

Ken, a software specialist from South Australia, looked across the table and said, "You guys ought to stop by Eden Bay on your way outta here. Legend has it an ailing killer whale drifted into the port back in the 18th century and some of the shoremen nursed it back to health. Thereafter the whale hung around and began guiding ships into the harbor. In fact, it became routine practice for captains just to follow the whale in. Later it began tagging along on whaling expeditions, rounding up whales and herding them into range. After a whale had been harpooned, Orca would apparently take the rope in his teeth and swim against the force of the caught whale. For such service he always received the tongue of the captured whale, his favorite delicacy. When he died, they hung his jaws up in the saloon where to this day one can see the grooves worn in the back teeth where he had towed the line for so long."

Ian shifted the subject toward sharks, and Steve told him that on the last trip someone had caught a six-foot white-tip shark on a fishing line. They gaffed it, got it up on deck. But before anyone could grab it, the shark bit through the steel leader and jumped overboard. Ian didn't say anything, but he was grinning. I could see the lamps on the wall reflecting in his eyes.

Night diving on the Great Barrier Reef can be eerie. In the darkness you can't get a firm grip on anything. Hanging suspended in the center of a black universe, it's hard to tell where the sea ends and the sky begins. Reality softens, loses its edge and the imagination comes alive. Campbell and I split off from the group. Hovering above a ledge

of coral, alone, with our lights out, we watched four divers come up over a crest of coral, Silomes glowing like green eyes, torch beams walking the bottom like so many stick-legs of an unlikely bug. The creature-of-light paused, then lurched steadily toward us.

We found enormous shrimp; a sleeping toadfish that didn't object to our petting it; fish floating upside down—flying perhaps in their dreams; and one parrot fish tucking itself in the night with a web of mucus.

Every reef is like an oasis sprung from the sand desert floor of the ocean, each with its own indigenous plant and wildlife. We saw our first sea wolves at Pixie's Pinnacle, plus lionfish, unicorn fish, crimson squirrels, and double-ended pipefish that looked like the head of a horse attached to a snake. The wolf clan (barracuda) traveled in a tight pack and kept their distance, an eye toward us, always. Toward the end of the dive another minke whale and her calf showed up and escorted us back to the boat.

There are moments in diving when you feel your heart redlining. Just for an instant, it kicks into hyperdrive. Making eye contact with a large sea creature trips the turbo charger. Here in a place we weren't meant to be, it leaves you weak.

Cod Hole is a place to pace your heart. Rumors—and there were plenty the preceding night—could not have prepared us. Even before we stepped in, the monsters were circling the water, eyeing us. They are known as potato cod and they are not shy. None weighed less than 400 pounds, and all had mouths that made you feel like Jonah. But something about their eyes . . .

We took down chunks of mackerel, hidden in our BC pockets. The cod knew this, of course, and if you did not

Approaching the Great Barrier Reef near Pixie Pinnacle.



produce, they'd sidle up and give you an elbow, staring with cold blue eyes four times the size of our own. These eyes would swivel on ball bearings, each operating independently from the other. They could follow two divers at once in opposite directions.

We came up for air and a quick lunch, then returned to tending our cod. Hermie was able to swing a leg over the back of one, and ride it like a horse, if only for an instant.

"Feeding them requires delicate finesse and quick reflexes," Hermie warned beforehand, gesturing with his left hand still tattooed with scars not yet healed from last week's dinner guests. I looked down once just in time to see Hermie getting even. Finning toward the side of a cod at considerable speed, head down torpedo style, he rammed the fish broadside. He bumped the cod over slightly in the water, but the fish merely cast a lazy eye over its shoulder to see who the clumsy diver was. This cod could not be bothered, it was intent on Asho feeding an 11-foot moray eel.

Following the cod's example, several eels had become remarkably bold, and fat. While Steve, our chef, was busy cooking up trouble between two cod, a nine-foot green eel slithered up from behind, went unnoticed between his legs, then up inside his BC jacket and out the neck, turning to face him point blank. You could see the whites of Steve's eyes from 15 feet away. Once the baitfish was gone, cleaner wrasse arrived and began picking the microscopic fish residue off our open hands, casting skiddish glances upward all the while.

Unlike most creatures of the sea, the impersonal clams have no eyes to communicate with personally, and yet they're responsive in their own way. The clam clan residing on the Reef was getting on in age, over 150 years old in some cases, and they were colossal. Sprawled haphazardly about Ribbon Reef #5, they measured three feet across at the jaws. Inside, an orange glowing tube bore a striking resemblance to a miniature volcano surrounded by a film of iridescent colors, as puffy as an overstuffed chair. I reached out to stroke the velvety interior of one, and the trap slammed shut with mechanical precision.

One diver took down a leftover sausage from breakfast and after he failed to tempt any fish with it, ended up shoving it down a clam's tube to see what would happen. The annoyed clam clamped shut. The diver shrugged and swam off. Several minutes later another diver passing by saw this clam open and eject the sausage. Certain that he must have just witnessed the laying of a clam egg, the incredulous diver scooped it up and carried his find back to the boat



Travel Tips

Getting There

Take my word and take Qantas. Their fares can't be beat, nor have they ever been lower—\$1,095 round trip from Los Angeles to Cairns with one stop in Honolulu. The on-board motto "all drinks, all free, all the time" makes flight time disappear. But the real boon to divers is the unrestricted weight limit. Nearly every carrier charges overweight penalties that traditionally drag down divers. Qantas lets you bring it all for free. United and Continental also fly the routes but require a domestic flight from Sydney to Cairns. The Qantas price is off-season with 21-day advance, with penalties for cancellation. It's best to check all carriers before making a reservation.

The Best Dives

Australia offers a wide variety of diving from freshwater cave diving at Isle of Pines to temperate water kelp bed diving in Tasmania, to the Great Barrier Reef along the northeastern coast. The best of the reef is the northernmost section and Port Douglas, 45 minutes north of Cairns, makes the easiest and least expensive point of departure. Because the outer reef is 60 miles offshore, you won't get in much diving on day trips although several one-day charters are offered, such as the Quicksilver out of Port Douglas.

where he was met with snide comments over a more likely resemblance the sausage had.

That night, only four of us made a dive, so while suiting up on the back deck we decided to concoct a story to flaunt at the other divers. We agreed that we'd all catch a ride on a whale. Somehow word leaked back to the cabin, but while we were down, Hashish in his usual style scared up a giant sea turtle that lifted off the bottom and kept

circling up in my light beam until it bumped right into me. Campbell was laughing underwater, trying to get air. For myself, my hands were full of tortoise and all I had was a macro lens so I took a picture of its eye. When the thing would not leave me alone, I reached out, caught it by the shell and off we slid into the black interior.

Well, we didn't need the whale tale anymore, but back on board no one believed us. I promised to send them a pic-

(Please turn to page 78)

Three-day, live-aboard trips let you see more of the reef, but much of the time is spent powering from one point to the next. I'd suggest a week-long trip that allows an enjoyable pace and time enough to reach the best dive sites.

Fantasy Dive Charters, PO Box 241, Port Douglas, North Queensland 4871 (070-98-5195) makes the choice easy, albeit unfair. With five staterooms including sinks and double or single beds, central air and stereo, sun deck, a divemaster who can't stand to dry out, and a certified chief intent on proving his qualifications, it leaves little in its wake for comparison. Either six- or ten-day trips leave regularly year-round on the Si Bon for \$600-\$800 all-inclusive. Each diver has his own storage locker in the suit-up area and the same tank is used throughout the trip to eliminate time-consuming BC and regulator exchange. Complimentary wine is served with every dinner. Transfers to and from the Cairns International Airport are provided.

Bicheno Dive Center, 4 Tasman Highway, Bicheno, Tasmania 7215 (003-75-1138) offers self-contained diving arrangements at extremely reasonable rates. Seven-day packages run \$300, or separately purchased, boat dives \$12, fills \$3, and tank and belt rental \$9. Diving includes the company of seals and periodically 150-foot long southern right whales, kelp beds that grow three feet a day to over 100-foot lengths, expansive sponge gardens, a family of weird underwater residents like sea dragons, jeweled anemones, sea whips, and foot-long seahorses. The unusual underwater bed consists of granite and white sand rather than the more typical coral found in most saltwater environments.

The FAUI (Federation of Australian Underwater Instructors), 580

Victoria St., North Melbourne 3051 (03-328-3217) will provide information on dive charter operators or on cave diving, wreck diving, and other specialized dive locations in and around Australia.

For instance, the Australian Cave Diving Association recently discovered what appears to be the deepest underwater cave in the world. In attempting to reach its farthest recess, a team of divers took down several banks of tanks last year and spent three days underwater. They failed to reach its terminus... yet.

Monkey Mia, on the western coast north of Perth, is a curious bay where generations of wild porpoises have been coming close to shore apparently just for human contact. They play in the shallows, talk to children, and offer rides to divers and swimmers.

One other referral source is Down Under Dive Travel, PO Box 78, Mackay, North Queensland 4740, (008-07-5065). Acting as a travel agent for the diving industry, it can advise, supply information, and even book dives.

Sea Safaris of Manhattan Beach, California offers package trips to Australia. They can be reached at (800) 821-6670. In California (800) 262-6670.

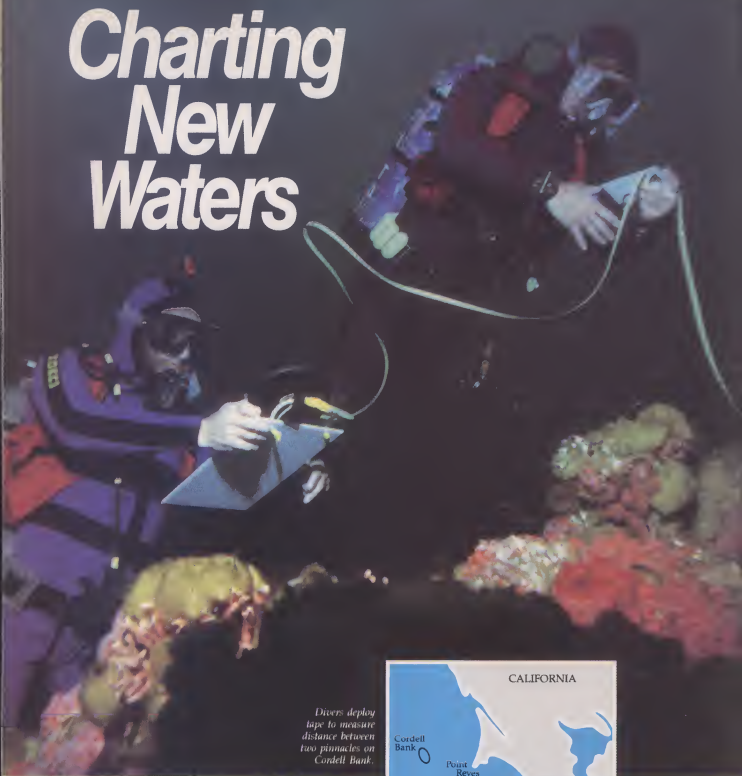
When To Go

By far the best season is winter (June-September) with no bugs whatsoever; comfortable temperatures in the 70- to 80-degree range rather than a humid 100-plus the rest of the year; fewer people (we did not see any other divers or even any boats on the reef our entire trip); more attractive off-season rates; better visibility; and if for no other reason, because that's when the whales come in to visit.

The best advice yet: Take more film than you think you'll need.

S

Charting New Waters



Divers deploy tape to measure distance between two pinnacles on Cordell Bank.



*Until 1978, no diver
had explored the Cordell Bank.*

*This extraordinary
seamount is now a candidate to
become a national marine sanctuary.*

At 150 feet, air bubbles slide out of my regulator sounding like gravel being poured from a metal bucket. We are 20 miles from the nearest shore on a ridge-top of a large Pacific seamount named the Cordell Bank and the scene below is incredibly bright. Anemone, hydrocoral, sponges, and algae cover everything in sight, in many places growing on top of each other.

While collecting some of these organisms, we are suddenly flushed with a euphoric giddiness. We try to smile, but numb lips and the regulator make the effort that much sillier. Struggling to control the narcosis, we keep collecting and exploring. All too soon, however, my buddy waves a thumbs-up in front of my mask. Now where's the ascent line? A flashing strobe catches my eye and I swim toward it. The line's there, so we follow our bubbles—but not to the surface. At 10 feet, we both grab the regulators of full scuba tanks. The decompression wait seems eternal as we can hardly wait to tell the others about our dive to where no one before has been.

Robert Schmieder PhD of Walnut Creek, California is obsessed with the exploration of Cordell Bank. In 1977, while studying a chart of northern California's coastline, this atomic physicist became intrigued by Cordell Bank, which is 20 miles due west of Point Reyes to the northwest of San Francisco. The chart showed there was at least one shallow place with a depth of 20 fathoms or 120 feet. It could be dived using regular scuba tanks, so Schmieder assumed it had been. But when he asked a few diving friends if they had ever been there, he discovered none had. So he talked to people with the Coast Guard, the Navy, the California Academy of Sciences, the University of California at Berkeley, the Department of

BY ROBERT ROBINSON

A Sacramento, Calif.-based free-lance writer, Robert Robinson has been published in *Sea Frontier*, *Sierra*, and *Travel-Holiday* magazines.

Fish and Game, the Geological Survey, the National Oceanic and Atmospheric Administration (NOAA) and others. After a couple of months, Bob realized to his amazement, no one knew much about the bank at all. The idea of exploring Cordell Bank soon became a serious goal.

But Bob expected many dangers. Deep diving can always be dangerous, especially with scuba because of nitrogen narcosis and decompression problems. Additionally, he knew the water was cold, and a fairly stiff current of one or two knots ran in the area. Two knots is nearly impossible to do any work in. To make matters even worse he expected to encounter lots of sharks, including great whites, since Cordell Bank lies about midway between Tomales Bay and the Farallon Islands, both places where great whites are known to congregate.

The fishermen in Bodega Bay knew the Bank well as an excellent fishing area, so Bob lined up a boat and skipper from there. After extensive discussions with several of his regular diving partners, he announced his plan to divers in the Sierra Club's Loma Prieta Chapter from the San Francisco Bay Area in October of 1977. He knew exploring the bank would require a large support group. At an organizational meeting held in the U.S. Geological Survey chambers in Menlo Park, the group

divers for a trip. Finally, on October 20, 1978, with just five divers, Bob made it to Cordell Bank.

As Bob recalls, "What we saw on that day absolutely astonished us. We were totally unprepared for the light level. Not only was it not dark, it was incredibly light. After I made the first dive with a buddy, I told the other divers not to take their lights, as they simply would not need them. It was so light you could almost read. And we had been to a depth of close to 150 feet.

"There were enormous aggregates of 12-inch fish swimming around above the pinnacle. To us, it seemed an incredible snowstorm of fish. When we finally broke through the fish on our way down, our entire field of vision was just filled with this miraculous sight. We could see colors—reds and oranges and yellows—and the rocks were covered, just inundated, with organisms. Sponges, especially *Corynactis* (strawberry anemone), pink hydrocoral, hydroids, and a lot of large-bladed algae. It looked as if someone had landscaped it. We were just overwhelmed."

On the first dive, they collected nearly 50 species, including at least one new genus of algae and one new species. Since then, by working closely with a number of professional biologists at the University of California at Berkeley, the California Academy of Sciences, the Los Angeles County Museum, the Geologi-



California hydrocoral.

elected a divemaster, and all but one of the 40 people attending pitched in \$40 apiece to kick off Cordell Bank Expeditions.

After a few practice dives at Monterey and at the Farallon Islands, Bob felt his group was ready to go to Cordell Bank. Unfortunately, he ran into numerous difficulties. Most importantly, a number of divers had dropped out of the group, so Bob had trouble gathering enough

cal Survey, the Smithsonian, and other institutions, they have sorted and identified their new collections until the list now includes more than 400 species.

Since that first dive, made possible by the Sierra Club divers and by grants from such organizations as the San Francisco Foundation and the National Geographic Society, the Cordell Bank Expeditions have evolved into a member supported, systematic data-gathering or-



Seen at 140 feet, rocky ledges are typical of the terrain of the Cordell Bank.

ganization that recently bought its own research vessel, the *Cordell Explorer*. They bought a LORAN-C receiver and carried out depth surveys back and forth across certain areas, measuring depths and recording positions. From that data, they were able to generate their own set of charts. Those charts became a major help in carrying out more successful dives, as they could more reliably find the pinnacles and ridges they wanted to dive. In the summer of 1985, Bob and a colleague were able to obtain state-of-the-art hydrographic survey data on the Bank as a result of a project conducted by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS). That survey covered the 200-mile Exclusive Economic Zone (EEZ) off the coast that the U.S. claims control over. Cordell Bank may well be the best surveyed feature off the coast of North America.

Aside from collecting specimens and surveying, the expedition also used 35-millimeter photography, plus super 8-millimeter, 16-millimeter, and videotape cinematography. Some of their photographs have been useful in identifying species that didn't show up in their collections and in showing physical features the divers may not have noticed during their dives.

They have found this seamount is roughly elliptical and, at the 50-fathom depth, it is $9\frac{1}{2}$ miles long by $4\frac{1}{4}$ miles wide. It lies right on the edge of the continental shelf and is the northernmost such shallow place all the way to Canada. The bank is a distinct plateau with

its flat top rising to the 30- to 35-fathom depth. Atop this plateau, at least four cliffy ridge systems, two in the north and two in the south, and several pinnacles reach to diveable depths. In fact, the shallowest point the expedition has found is about 19 fathoms (114 feet) and is part of a ridge system in the northeast.

Growing on this 19-fathom peak is a dense, whitish cap of barnacles and red algae. Below this, from 20 to 25 fathoms, the sessile community grades to nearly foot-thick piles of sponges, anemones, including the common Strawberry Anemone *Corynactis californica*, California Hydrocoral *Allopora californica*, hydroids, and tunicates. Space is the limiting factor. The organisms are very brightly colored with reds, yellows, white, and pinks. At 30 fathoms, the community thins to a few large, widely spaced creatures, mainly sponges, urchins, and anemone. By 35 fathoms, bare rock dominates the scene. Around 200 feet in various places, brilliant white sediments of almost a hundred percent shell fragments accumulate.

The Cordell Bank community is very healthy showing little evidence of disease or death, because the California Current brings clean, clear, cold (50 to 55 degree F) water, with a high nutrient content, upwelling to the relatively shallow bank. When the disruptive El Nino current occurs off California's coast, the water temperatures at the bank rise to over 60 degrees. The sun's rays penetrate this water so deeply divers can take photographs using available light at 150

feet. Visibility is sometimes as good as 100 feet. Because of the water's clarity and nutrient load, photosynthesizing organisms support a vast and complex food chain up to large fish, birds, and mammals.

Cordell Bank has long been known as a superb fishing area. Groups of rockfish congregate around the pinnacles, sometimes so thickly, divers report white-out conditions. Besides rockfish, sport fishermen regularly catch lingcod, yellowtail, salmon, albacore, and shark. Oddly enough, the divers have yet to see great white sharks, in spite of the fact that the great white's favorite prey, seals and sea lions, are at the bank. They have, however, seen blue and mako sharks.

Like rockfish, seabirds often congregate around the pinnacles, and it was just such gatherings that enabled the expedition to initially home in on shallow points to dive. On surveying and diving trips since 1978, volunteer observers from the California Marine Mammal Center and San Francisco State University have recorded many sightings of seabirds and mammals at or near Cordell Bank. They've seen 33 species of seabirds including black-footed albatross, northern fulmar, surf scoter, south polar skua, common murre, pigeon guillemot, tufted puffin, and brown pelican. The endangered brown pelican was particularly noteworthy because it was sighted on about two-thirds of the trips.

The observers also recorded fourteen kinds of marine mammals. Of special interest were two endangered cetaceans, the humpback and blue whales. Both species feed at the bank. The team's most exciting encounter with blues occurred on October 10, 1982, when a pair approached from off the port bow, surfaced 30 yards away, visibly swam under the ship, and surfaced again several hundred yards astern. Marc Webber and Steven Cooper, reporting for the group, felt the number of blue whale sightings "represents a substantial number of records for this species over the continental shelf in the Cordell Bank area, and along with probable observation of feeding suggests this area is an important autumn habitat for this species." Also of particular interest were sightings of northern elephant seals whose pelagic habits are not well known. Other observed mammal species were Minke whale, Dall's porpoise, harbor porpoise, orca, Pacific white-sided dolphin, Riss's dolphin, northern right whale dolphin, California sea lion, Steller sea lion, northern fur seal, and harbor seal. These have all been autumnal observations. The expedition has restricted their trips to the fall because the weather is most predictable at that time and be-

cause the California and Davidson currents more or less cancel each other out, which makes diving more practical.

The greatest mysteries Bob and his divers have encountered are a number of large, cylindrical holes that lie right on the sharpest, highest parts of the ridges. Some holes appear to be man-made, but others look natural. Hearsay has it the holes were made by the U.S. Navy about 15 to 20 years ago in a project related to submarine detection. Bob's expedition was once followed for nearly an hour by an unidentified submarine. In spite of his security clear-

ance, Bob has been totally unsuccessful in learning anything from the Navy about any of this.

Cordell Bank is now an active candidate for becoming a national marine sanctuary. The Sanctuary Programs Division (SPD) of NOAA, which is in charge of the sanctuaries program held its first informational hearing on the bank in San Francisco on April 25, 1984, and, at this writing, is about to publish the draft Environmental Impact Statement and other documents.

Bob is optimistic about Cordell Bank's future. He believes, "It's incumbent

upon those of us who wish to preserve certain areas of our environment like museums, to set up the legislation to protect those areas. We don't give any thought whatsoever to commercially developing Yosemite, because it's become part of our national environment, our cultural heritage. And our marine sanctuaries will become the same way. I hope and believe that 50 or 100 years from now, areas like Cordell Bank, which had long since been designated marine sanctuaries, will be part of our national heritage and will be considered inviolate."

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Creating A Marine Sanctuary

The federal marine sanctuaries program was established by Title III of the Marine Protection, Research, and Sanctuaries Act of 1972. This law provides that areas in the ocean as far out as the edge of the continental shelf and in the Great Lakes may be protected.

During its first 5 years, the program crawled slowly along, because no funds were appropriated. By 1977, only two marine sanctuaries had been designated. The first was a six square mile site off Cape Hatteras, North Carolina, to protect the wreck of the U.S.S. Monitor, and the second was Key Largo Coral Reef Marine Sanctuary adjacent to John Pennekamp Coral Reef State Park in the Florida Keys. The latter covers 100 square miles. In that year, 1977, President Carter, in an environmental message to Congress, expressed support for the program and boosted funding. In contrast to the law's original intent, Carter was trying to protect areas threatened, in this case, by offshore oil development. As it turned out, one of Carter's last official acts was the designation of three new sanctuaries: Looe Key in Florida, Gray's Reef in Georgia, and the Gulf of the Farallons off California. (Cordell Bank neighbors the last sanctuary.) Once again, the program has been slowed by restricted funding

under the Reagan Administration.

The slowness of the marine sanctuaries program is especially disheartening, because all the land is under state or federal control already and doesn't require acquisition funds. Money is needed only for evaluating potential sites, managing a site after it becomes a sanctuary, and enforcing the protective laws.

As it is currently set up, the marine sanctuaries program works in the following way. Any organization or member of the public may send nominations to the Sanctuary Programs Division (SPD) in the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) for consideration. The idea of nominating a place need not be intimidating. As Bob Schmieder found out, "the nomination itself doesn't need to be very specific at all. Of course, if the (SPD) already knows about a site, which they had already known about Cordell Bank from information I had given them well before the nomination, (then) the actual nominating step was simply a letter from me to them saying I would like to nominate Cordell Bank. If a site is totally unknown and you're preparing a nomination, then you need to include some details and some information, so that they will have some knowledge of it. That's all."

Formerly, a nomination was automatically placed on a List of Recommended Areas, but this has been replaced by a Site Evaluation List (SEL) that includes nominated sites meeting certain preliminary criteria. After review by the SPD staff, the SPD can promote the area to active candidacy. At that point, they'll produce draft documents, including a

management plan, environmental impact statement (EIS), and a designation document. These will be circulated among interested individuals, organizations, and governmental agencies. They'll also schedule public hearings in the communities nearest the candidate site to get additional input. From that they'll produce final documents and circulate those and hold more hearings. A recent addition to the process is that Congress will have the opportunity to review a site's candidacy and to hold their own hearings. Cordell Bank will be the first marine sanctuary candidate to receive such scrutiny. If the site is within state jurisdiction, then that state's governor may veto the designation, but this won't necessarily cancel a site's candidacy altogether. (Cordell Bank isn't in state waters.) After all of these steps the Secretary of Commerce can sign the designation document and the site will become a national marine sanctuary.

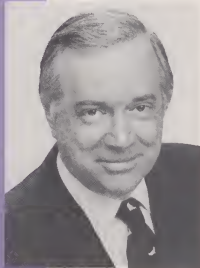
If you're interested in helping Cordell Bank become a sanctuary, then you should write to Dr. Nancy Foster, Director, Sanctuary Programs Division, 300 Whitehaven St. N.W., Washington, DC 20235. Attending scheduled hearings to support the proposal would also help.

Bob is also looking for help with future exploration of the bank. He's always interested in assistance from divers who have deep diving experience and from professional biologists or geologists who would be interested in examining collected specimens. If you're interested, write to or call Cordell Bank Expeditions, 4295 Walnut Blvd., Walnut Creek, CA 94596; (916) 422-2821, or (916) 934-3735.

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Celebrity Seafood Sampler

Hugh Downs



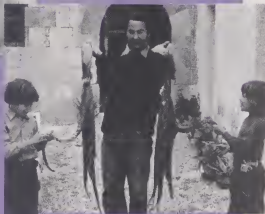
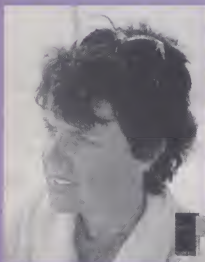
Hugh Downs

There's no arguing Hugh Downs has lived, and at 66, he is still living an exciting, fulfilling, and adventurous life. Brought up on an Ohio farm, Hugh has mastered the art of making the most of his life and its opportunities.

Hugh Downs needs no introduction, however, it may surprise some to discover he has an inner penchant for danger. One thinks of Downs in terms of a personable, quiet man, anchoring some of our most popular television series in the last 40 years, including his current, highly rated "20/20." But that merely scratches the surface of this man's interests, to say nothing of his talents. Calm, serene, and assured in front of a TV camera, Hugh personifies the bashful farm lad, and certainly belies a fiercely adventurous spirit that prods him mercilessly into hands-on experiments that have lent him experience and expertise in an array of diversified areas.

Downs is at home soaring high above the earth in his sailplane, slicing around a racetrack in a Formula A racing car at 175 mph, and riding bareback on one of Sea World's killer whales. It should come as no surprise that he is an avid diver. Hugh doesn't seek to come up with a wet suit full of gold doubloons and jewels, but his underwater experiences include diving the Great Barrier Reef in Australia and most other oceans of the world. Off Tortola, he has dived in search of the lost Spanish galleon, San Ignacio. Diving to probe wrecks is his favorite underwater activity, and al-

Mia J. Tegner



Willard Manus

As diversified as their underwater interests are, these three divers share a common love for the gastronomical delights of the sea. Scientists—finally all in agreement—conclude that seafood tends to lower and keep our blood pressure at a healthy level, and are largely all of us in our plums of fish. Although the media has been spreading the news that seafood is just about the best food we can eat for robust health, many people still adhere to old ideas and habits. Fortunately, as divers, we are attuned to the sea and its bounties. But even with us, a little reminder is appropriate now and then. Hugh Downs, Mia Tegner, and Willard Manus, whose interests are outdoors with their favorite seafood recipes, are offering reminders of the benefits of seafood, and serving as a little reminder.

BY MAVIS HILL

Freelance writer Mavis Hill specializes in diving, seafoods and sea life. She has authored over 200 articles on edible sea life, plus a book, *The Edible Sea*.

though to use his words he's "hooked on danger." Downs is a careful, intelligent scuba diver, never taking unnecessary chances.

Hugh also admits to being color blind, but like other color-blind divers, he still has a deep appreciation of undersea splendors. We do wonder how the beautiful bright orange color of sea urchin roe appears to Hugh as it happens to be his favorite seafood. Because he eats it raw, Hugh has no recipe. Therefore, from our book, *The Edible Sea*, we offer directions on cleaning and eating raw sea urchin roe, plus a recipe for raw sea urchin dip.



Sea Urchin Au Naturel

The sea urchin is found worldwide, mostly in shallow waters, and boasts 800 species. Each urchin has five egg sacs nestled against the inside perimeter of the shell, or "test." Each egg sac is shaped somewhat similar to an orange segment. The eggs are sweet and at their best when they are full and orange colored. Sacs of the male are yellow and are edible but not quite as tasty as the orange, female roe. The orange eggs are very good eaten raw, whereas the yellowish, male eggs are better used for cooking and mixing with other ingredients in dips and spreads.

To get to the roe sacs, simply crack the urchin open at the bottom or cut it in half with a heavy knife. Dump out the watery material (this is edible also, but most people haven't a taste for it) and find the egg sacs against the rounded shell. The roe may be eaten right from the shell or used in combination with an assortment of other raw fish and scallops.

Sea Urchin Butter or Dip

- 1/4 cup sea urchin roe
- 1/2 cup butter (for dip, substitute 1/2 cup sour cream)
- Garlic salt to taste

Put the butter or sour cream in a blender and add the sea urchin roe until you have a definite sea flavor. Add garlic salt or whatever else pleases your taste, such as minced onion, garlic, or bits of seaweed, which will also add eye appeal.

Mia J. Tegner

As Associate Research Marine Biologist for Scripps Institution of Oceanography, University of California at San Diego, Mia Tegner acts as a community ecologist specializing in kelp forest ecology and nearshore marine resources.

She is married to Eric Hanauer, who has also appeared in this column. Mia spends much of her leisure time modeling for Eric's underwater photographs.

One of the university's most able scientists, Mia received her PhD in marine biology from Scripps in 1974. Since then her research projects have included studies of the red sea urchin fishery, experimental methods of replenishing Southern California's rapidly depleting abalone stocks, and the recovery of kelp forests following El Ninos currents and the heavy storms that periodically hit lower California.

To accomplish this research, Mia makes some 150 dives per year. She spends a lot of time below the surface. A great deal of her time is also spent writing up her experiments which are published in various scientific journals and presented at professional meetings.

Scripps has received a three-year grant from the National Science Foundation to study the reproductive ecology of different kelps.

"While it may sound a bit arcane, this knowledge will help us understand how kelp forests recover from severe disturbances such as the massive storms and warm water associated with the El Nino of 1982-1984," Mia said.

The recipe below is designed for crab, but Mia says it works extremely well with lobster and is an elegant dip for company where there isn't enough lobster to go around.



Hot Lobster Dip

- Eight-ounce package cream cheese, softened with 1 tablespoon milk
- 1 lobster tail, cooked and shredded (or 7-ounce can crab meat)
- 2 tablespoons finely chopped onion
- 1 teaspoon horseradish
- Salt and pepper to taste

Mix all ingredients, place in an oven-proof serving dish, and bake at 375° for 15 to 20 minutes. Serve at once.

Willard Manus

Having known Will Manus for some 16 years, I can readily attest to his skill and integrity both in front of a typewriter and as a diver.

An author by profession, Will lived with his family from 1960 to 1969 in Lindos, Greece, where he regularly dove

the waters of Cyprus, Lebanon, Turkey, Israel, and other areas of the Mediterranean. Always a free diver, Will's main diving interest is gathering seafood, particularly octopus.

Manus is a versatile writer and puts his hand to anything that comes up, be it novels, television series, short stories, magazine articles, radio scripts, plays, screen plays, or just plain newspaper reporting. That is, if you can call being managing editor or foreign correspondent "just plain reporting." Will has completed several novels, the latest is *The Fighting Men*, the first novel to explore the dark history of Vietnam by dramatizing the reunion of a group of American vets who fought together in that war. (Published by Panjandrum Books.)

Will Manus presently lives in Beverly Hills, California, with his wife, Mavis, who is a superb chef and co-author of *The Art of Russian Cuisine*, published by Macmillan Company.

Diving mostly in Southern California these days, except for frequent trips back to Greece, Willard and Mavis are connoisseurs of Greek cooking and this recipe is one of their finest.



Octopus Pilafi (Greek)

- 2 pounds tenderized octopus, cooked with 2 tablespoons vinegar and 1 bay leaf
- 1/2 cup olive oil
- 1 finely chopped large onion
- 3 peeled, chopped tomatoes
- 1 teaspoon (each) salt and pepper
- 1/4 cup vinegar
- 2 cups rice

Cook octopus in water with vinegar and bay leaf, covered, over low heat until tender; about 35 minutes. Reserve the liquid. Cool slightly and cut into 1-inch pieces. Heat the olive oil and add the chopped onion and peeled tomatoes. Cook until they are soft. Add the salt and pepper. Add the 1/4 cup vinegar and let the dish sizzle. Add 5 cups water (include the reserved cooking liquid) and bring to a boil. Add the rice. About 10 minutes before the rice is done, add the octopus and shake the pot. Continue cooking until the rice is tender. Serve as part of a buffet dinner or an entree with a salad. Cheese and fruit are nice at the end of the meal. A white Bordeaux or a chilled, lightly resinated Greek white wine are excellent with octopus dishes. **S**

SHOPPERS' CORNER



NEW TOPSIDE FASHIONS

The handsome, functional "Windjammer" jacket shown above left, features a two-tone gray and black outer shell of Burlington "VersaTech" fabric for maximum water repellency. It has a ventilated mesh lining allowing for excellent breathability. The "Windjammer" also has a zip-thru convertible collar and two outer pockets with storm welts. It is available in small, medium, large and extra large.

Made of long wearing polyurethane "Dura-Hide," the SCUBAPRO "Avanti" jacket gives the appearance of fine leather. Perfect for semi-dress or sport attire, the "Avanti" has a stand-up collar with zip-out storm collar. The jacket features many pockets, including a distinctive chest pocket, as well as a sleeve pocket and standard front pockets. The "Avanti," shown above right, offers

enough pockets for just about anything. It is available in small, medium, large and extra large.

The SCUBAPRO "Poplin" baseball cap is made of black cotton/poly blend with a one piece front. The cap is embroidered with silver lettering and is a perfect "top" for any of SCUBAPRO's fashion outfits. One size fits all.

SWEATSHIRT AND WARM-UP PANTS

Stay warm and look great in a new, classy SCUBAPRO sweatshirt made of 50 percent acrylic fibers and 50 percent cotton luxury blend fleece. Complemented by a double-stitched yoke and three-button front, this sweatshirt features white "puff" print lettering on the front of the white sweatshirt.

SCUBAPRO's warm-up pants are perfect for after-dive attire. Matched with a SCUBAPRO sweatshirt, they become a complete outfit. The warm-up pants are Navy blue with white lettering and are available in small, medium, large and extra large as is the sweatshirt. All fashions are available exclusively at your local SCUBAPRO dealer.

NEW SWEATSHIRT, "T" SHIRT AND COTTON SHORTS

Sporting the "oversize" look, short sleeves and crew neck, the new SCUBAPRO sweatshirt is a must for the diver who likes to look great. Ideal for after-dive wear or just lounging around, the sweatshirt, shown above left, is available in medium, large and extra large and features SCUBAPRO's new "puff" lettering in white on the aqua colored sweatshirt.

SCUBAPRO's "T" shirt is made of 100 percent, heavy weight, preshrunk cotton. It features a knit crew neck collar, hemmed cuffs and waistband with SCUBAPRO's

logo printed on the pocket and SCUBAPRO printed on the left sleeve. The "T" shirt is available in small, medium, large, and extra large.

For the latest look of comfort in 100 percent crinkle cotton, choose SCUBAPRO shorts. With elastic drawing and two side pockets, the shorts are perfect for everyday wear. They are available in small, medium, large and extra large.

SCUBAPRO G250 SECOND STAGE

"The G250 was designed for total breathing comfort!" This promise is contradictory within itself because what would be comfortable to one diver and set of conditions may very well not be comfortable to another. So how can we make this promise? Simple . . . the G250 can be adjusted "in the water" to breathe exactly the way the diver chooses. Both the initial inhalation resistance and the aspirated flow can be adjusted by two external controls at the diver's discretion.

SCUBAPRO has also formulated a new graphite-reinforced nylon case for the G250, making it nearly indestructible. The graphite-reinforced nylon case is 30% lighter, and its impact resistance is 2½ times greater than before. Remaining corrosion free and completely "state-of-the-art," the G250's graphite-reinforced nylon case will provide a lifetime of durable service.



SCUBAPRO "SAFETY" KNIFE

SCUBAPRO's new "Safety" Knife is the answer to all diving knife requirements. It offers maximum utility and minimum bulk, and is much more convenient to use and wear than any previous diving knife. An amazingly low profile and compact design permits the "Safety" Knife to be worn or





carried anywhere the diver chooses—leg, arm, weight belt, Stabilizing Jacket pocket—anywhere! The knife is made of 100 percent 316 stainless steel and features one piece construction and a blade specifically designed to meet underwater requirements. Housed in a low profile sheath, the SCUBAPRO "Safety" Knife is a cut above all other knives for diving utility or personal safety topside. Overall length is seven inches.

A.I.R. II

A.I.R. II (alternate inflator regulator) combines a power inflator and second stage regulator. It offers easy access because of its consistent position on your buoyancy device. The A.I.R. II design eliminates a low pressure hose, reducing clutter for the diver and the possibility of debris or sand accumulating in your safety system. Additionally, the A.I.R. II meets or exceeds standard requirements of certifying agencies. Order yours today from your local authorized SCUBAPRO dealer.



ALL RUBBER SEA WING

The All Rubber Sea Wing is an unique compromise between the pure power of a stiffer bladed fin and the total comfort of a flexible fin. The natural "snap back" of rubber provides excellent swimming efficiency, even at the lightest kick, and still has enough blade resistance to supply power when it's needed. If you're looking for a better Jet Fin, and you like basic black, the All Rubber Sea Wing is for you. Available at your authorized SCUBAPRO dealer, the All Rubber Sea Wing is produced in three sizes: medium, large, and extra large.

NEW TRI-VENT MASK

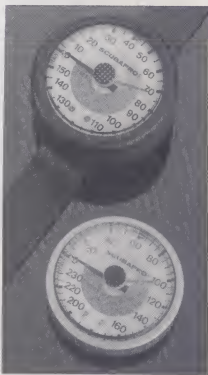
If you're looking for a purge mask that clears easily and vents the exhaust bubbles to both sides of the mask, the SCUBAPRO Tri-Vent is the answer. The newly designed purge valve is accurately positioned to drain "all" of the water from the mask with almost no clearing effort. The water and air exit the purge system through two tunnels designed to direct the flow "under" the mask and to both sides, keeping the rush of bubbles away from the path of vision. The side lenses are positioned to provide nearly normal peripheral vision and the front pane is a single piece of tempered glass with no

center obstruction. Fit and comfort are provided by SCUBAPRO's soft crystal Silicone skirt accented with either a blue or orange frame. You don't have to be an Old Salt to appreciate this mask. See it at your authorized SCUBAPRO dealer.



PRECISION OIL FILLED DEPTH GAUGES WITH MAXIMUM DEPTH INDICATOR

SCUBAPRO's most accurate family of Precision Oil Filled Depth Gauges has been expanded to include a 150-foot and 230-foot model. Both feature a convenient and easy to set maximum depth indicating needle. The needle is coated with high visibility fluorescent orange paint to prevent distraction or confusion during a dive. Combining this function with SCUBAPRO's most reliable and accurate depth gauge makes it the best value to date for the diving community. The new gauges are available with or without a nit module.



Storms, sea urchins and El Nino
have played havoc with California's kelp beds,
but help is on the way from
an unusual source.

Help the Kelp

Kelp is the most important marine organism on the West Coast. There are those who would dispute this, but few other species of plant or animal are as essential to coastal marine life as the brown algae, *Macrocystis pyrifera*, commonly known

West Coast divers are well aware of the vast numbers of fish and invertebrates found within a kelp forest. Common fish are surfperch, calico bass, kelp bass, barracuda, sculpin, sheephead and cabezon. Abalone and urchins graze upon kelp, and lobsters hide among the holdfasts that anchor kelp plants to the sea floor. Sea otters roll in the kelp canopy to coat their fur with a protective oil produced by the plant. The kelp snail spends its entire life climbing from the bottom of the kelp plant to its tip at the surface, grazing as it goes. When the snail reaches the top, it falls to the sea floor only to repeat the journey once again. Kelp beds are not merely a group of graceful exotic plants, they are a complete ecosystem.

It was Charles Darwin who first described the kelp beds as a forest. In 1834, after observing the kelp beds off the coast of Chile, he wrote, "The number of living creatures of all orders, whose existence intimately depends on the kelp . . . I can only compare these great aquatic forests . . . with the terrestrial ones in intertropical regions. Yet, if in any country a forest was destroyed, I do not believe nearly so many species would perish as would here, with the destruction of kelp."

The day may be close when we will discover firsthand how many creatures depend on kelp. In the past decade, California's kelp beds have suffered serious damage. In 1979, the kelp beds from Summerland to Point Conception covered 11.5 square miles. Today, those

as giant kelp. Giant kelp beds stretch for miles along the coastline, creating habitat, nurseries, and a food source for thousands of animal species. There is hardly an animal living in these waters, that is not in some way dependent on the giant kelp.

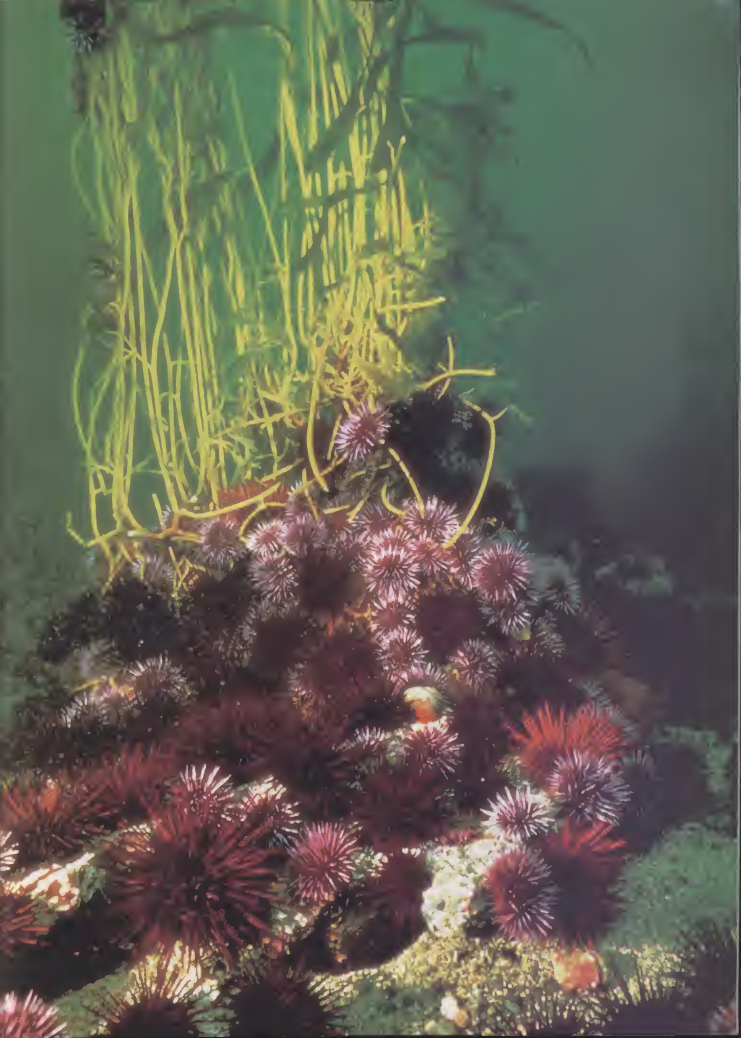
BY JONI DAHLSTROM

The writing/photography team of Joni Dahlstrom and Adam Zetter is based in Santa Barbara, Calif.



A kelp growth center is assembled, above. Once the juvenile plants are attached, the centers are dropped overboard.







Where kelp forests are healthy, they provide excellent diving.

beds have shrunk to 4.8 square miles, and almost three square miles of the remaining kelp is at Point Conception. The warm currents of El Nino, and the three worst storms in this century have destroyed virtually all the giant kelp beds between Santa Barbara and Point Conception, a distance of some 45 miles. Kelp beds south of Santa Barbara have been hit hard as well, not only by the storms and El Nino, but also by a plague of sea urchins capable of wiping out entire kelp beds and preventing their recovery.

The loss of the kelp forests would have a terrible impact on marine life of the West Coast. These waters, without kelp, would be like a forest without trees. Where once there was a world filled with living creatures, there might only be barren sand and rubble.

To combat the problem of diminishing kelp beds, and restore the forests to their former territory, the California Department of Fish and Game has awarded a \$199,000 contract to Kelco, the world's largest kelp harvesting company. The funds will help Kelco restore 60 acres of kelp beds over a two-year period.

Only a plant with the growth rate of kelp could be restored in such a short period. Kelp is the fastest growing plant on earth and has an astounding ability

to bounce back from devastation. Giant kelp can grow, or elongate to be more accurate, up to two feet per day. Kelp plants grow in 30 to 90 feet of water and can reach lengths of over 120 feet—the excess length floats on the surface forming a thick canopy.

A single plant consists of fronds anchored to the sea floor by tangled rope-like structures called haptera. The mass of haptera is called a holdfast. Each frond has a stipe, that is similar to a long tree trunk; pneumatocysts, that are small balloons to give the plant buoyancy; and blades that form wide, flat leaves. Unlike the parts of a terrestrial plant, all of the structures of a kelp plant absorb nutrients directly from the water.

Restoring the kelp forest is a complex process. For the most part, Kelco's program is experimental. They hope to restore 60 acres of forest and in the process determine the most efficient ways to do so. Kelco has devised a system of artificial growth centers, diver deployed recruitment wires, and outplant-transplant techniques to restore the kelp beds.

There are several factors that limit the growth of a kelp forest. First, the plants need light and nutrient rich waters. These are beyond the control of the research team. Conditions like the warm

El Nino current can leave plants starving for nutrients. But, whatever the weather and water conditions, the plants also require a substrate they can anchor on. This can be rocks or other stationary debris on the sea floor.

"The most difficult problem we had to face," said Dr. Craig Barilotti, program director and senior biologist at Kelco, "was how to make kelp grow on sand. Of 11 miles of kelp beds that formerly grew west of Santa Barbara, only two miles were anchored to rock. The rest grew on sand. We had to determine how these plants got started, what they anchored to and how they managed to grow to adults."

The research team at Kelco believes the kelp plants might have got their initial start on worms with hard body casings that burrow into the sand. Juvenile kelp plants can anchor onto these worms, and then spread their holdfasts laterally over the sand. If there are several kelp plants close together, the holdfasts will merge and form a mass like a low island. This huge mass of kelp holdfasts becomes a growth center. Wave action causes the growth center to become partially buried in the sand where it can serve as an anchor for a future generation of kelp plants.

Under normal conditions, the growth

centers would be self-perpetuating; each generation of kelp would supply new growth centers for the next. However, sea urchins and heavy storms had destroyed all the growth centers in many areas. Without growth centers, it is unlikely the kelp can repopulate these areas at any time in the near future. According to Barilotti, "Left on its own, it could have taken the kelp beds 50 years to recover from the damage we have seen in the past decade."

Kelco's primary means of restoring the kelp is to deploy artificial growth centers (AGC) to replace the lost natural centers. These growth centers consist of two layers of chain-link fence, four foot square, that are wired together about two inches apart. Six wooden spacers are sandwiched between the chain link fencing to give it stability. The chain link is coated with rug adhesive and sand, to form a surface the plants can anchor to easily.

"The design of these growth centers was a difficult process," Barilotti said. "The trouble is, whenever you place something on sand, the wave action tends to bury it." The AGC have a wide, flat profile, that prevents wave action from burying the entire center. Only the bottom layer of chain link gets buried. This leaves the top layer exposed as a surface for the kelp to attach itself. Kelco expects to have an average of three plants growing on each center. The AGC are deployed in 100-meter wide strips, running along the coast where kelp beds once thrived.

Another method involves the use of diver deployed recruitment wires, referred to simply as DDRW. The DDRW is made of large, thick-wire staples, with legs about 18 inches long. The wire legs are pushed into the sand, so two of them form an "X" that protrudes about two inches from the bottom. Five of the wire X's are placed in a large ring for the kelp plants to attach to and form a natural growth center. This is the easiest, and most cost-effective method of replacing lost growth centers.

DDRW's can also be deployed by dive clubs or any diver interested in kelp restoration.

Sea urchins are an ongoing problem for those seeking to manage the kelp forests. These voracious relatives of the starfish can eat their way through 30 feet of kelp bed per month. The urchins not only graze on the kelp fronds, cutting them off and setting them adrift, they eat the holdfasts as well. This destroys the natural growth centers that take years to develop, and prevents the next generation of kelp from getting started.

While commercial urchin divers harvest many red urchins, the purple and white urchins are running wild on the West Coast, eating their way through

the valuable kelp forests. Kelco divers have experimented with several methods of urchin control. The only proven method, that doesn't harm other species, involves divers going down and destroying urchins with hammers. This is a slow, expensive, and time-consuming process. At best, it only keeps the urchin problem at bay, outside of the kelp forests. It cannot solve the real problem of an urchin population explosion.

In areas where there are very few or no kelp plants, there is no spore source to repopulate the forest. The life cycle of kelp has two distinct phases. It regenerates by releasing free drifting microscopic spores from the bottom blades of a mature kelp plant. The spores develop into male and female gametophytes. The microscopic gametophyte is a critical phase, just as a seed is critical to the future of terrestrial plants. Only when the gametophytes have been fertilized and anchored to the sea floor, does the plant begin to grow into the giant sporophyte phase. If there is no spore source, then there is no hope of forest recovery.

Juvenile kelp plants can be grown in laboratories for transplant to the sea. It takes about three weeks for the plants to develop into viable juveniles that can be transplanted to artificial growth centers in the open sea. This method of restoration costs about \$2,000 per acre, as opposed to \$1,300 per acre for DDRWs. But, in areas where the entire forest has been destroyed, there is no other way to restore the kelp beds.

Kelco's interest in restoring the kelp forest is not merely one of scientific curiosity—call it enlightened self-interest. Kelco has been commercially harvesting kelp since 1929. In California, kelp is a \$35 million a year business.

The primary product derived from kelp is algin, an essential product to many food products and industrial processes. Algin is found in the cell walls of kelp plants, and can be extracted for use by industry. Algin is used as a thickening and suspension agent in products such as ice cream, salad dressings, beer and cosmetics. Probably not a day goes by that the average person does not come across a product utilizing algin derived from kelp. In many cases, there is no suitable substitute.

Giant kelp is harvested under strict guidelines set by the California Department of Fish and Game. Harvesters are not unlike huge lawn mowers that cut the kelp plants at a depth four feet beneath the surface. The cut kelp is then drawn onto a barge by huge conveyor belts and hauled back to Kelco's processing plant in San Diego. The kelp forest as a whole, is not damaged by the cutting as the reproductive portions of the plant are at its base, close to the sea

floor. Although a kelp plant may live for several years, each frond lives only about six months. Cutting facilitates the growth of new fronds while harvesting mature fronds that would soon break off and drift away.

Kelco was awarded the kelp restoration contract primarily because of their expertise in managing kelp beds. Kelco will also provide personnel and the use of their facilities at no charge to the project. The restoration work should be completed by 1990. If all goes well, 60 acres of kelp will have been restored creating habitat for sport fish and marine invertebrates. The healthy beds will provide recreation for divers and sport fishermen, while Kelco will have recovered some harvestable kelp, although not all of the beds will ever be harvested by Kelco.

However, there is more at stake here than the survival of a commercially important plant. The entire coastal ecosystem hangs in the balance. The loss of the kelp forests could well lead to a serious and permanent reduction in the populations of many other marine species. Our only hope for maintaining the resources of the oceans is effective management of habitat and the food chain. Kelp is essential to the ocean community on both counts.

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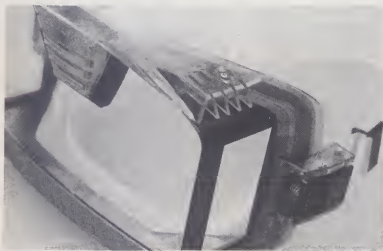
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The Tri-Vent can be easily cleared even without holding the mask. Peripheral vision is near normal due to the position and size of the side panels. Fit and comfort are provided by the Tri-Vent's soft, Silicone skirt.



At first look, SCUBAPRO's Tri-Vent mask seems all wrong. It's too big, and it has a purge valve. Everyone knows the trend today is toward smaller masks, and purge valves have had a bad name as far back as the 60s. But breaking with the accepted is exactly what makes this the first totally new mask design since SCUBAPRO introduced silicone over 15 years ago.

Advent of the Tri-Vent



Inverted mask shows tunnels which direct air and water to the sides, away from the diver's line of vision.

The Tri-Vent looks great, and performs even better. It has the lightest, brightest, airiest feel of any mask I've ever used. Those big side panels and the expansive faceplate combine to provide panoramic, peripheral vision. After using the Tri-Vent, looking through any other mask will seem like viewing the underwater world through a peephole.

But wait a minute. Aren't big masks harder to clear? Yes, unless they have a purge valve.

But aren't purge valves obsolete? There was a time when many instructors made their students tape them shut so they would learn to clear their masks the real way, without depending on a mechanical device.

The old purge valves had two problems. First, they were made of rubber, which would deteriorate into a gummy mess after about a

year. This would result in a sticky valve, or one that leaked. Second, most purges were too small to properly clear the mask.

The Tri-Vent's purge valve is made of silicone which will last as long as the mask. And it's big enough to get rid of all the water.

This new mask was inspired by SCUBAPRO's old Supervision, a three-window model with a purge valve, which continues to be a top seller. That's unusual, because the Supervision has been around since 1968, and is totally out of step with today's look in equipment. But it obviously has something people aren't getting in today's small, colorful, look-alike masks.

SCUBAPRO's engineers realized there are still lots of divers out there who want a purge. Their primary task was to design a new and better one. First, the purge had to be large. Next, it had to look good. The look of the old purge valves just wouldn't fly in the fashion-conscious 80s. So the valve was screened behind a vented plastic cover. The engineers also wanted a way to keep bubbles out of the diver's face. This was accomplished by tunnels

BY ERIC HANAUER

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built underneath the frame, directing water and bubbles out to the sides of the mask.

The purge valve was actually conceived and designed first, and a mask was built around it. This is contrary to the way masks are usually engineered. Standard procedure is to design the mask first, then add the valve. The result is usually an inefficient valve, that can't handle all the water.

With an effective purge, SCUBAPRO engineers were free to design a larger volume mask. The primary reason masks had become so small in the first place was to make them easier to clear. But there are two advantages to a large mask. First, it can fit more faces. The Tri-Vent was designed with a wide skirt and seal, suitable for 90 percent of all divers. Only the narrowest faces will be unable to use the Tri-Vent. Second, the larger size allows room for lots of glass, both in front and at the sides. This is really the bottom line: unprecedented vision, both top to bottom and side to side. It's the closest thing to not wearing a mask at all.

The underwater view through any three-window mask is like a triptych, a medieval painting on three panels. Sight of an object is lost briefly as it moves from the lateral to the frontal field of view. This is due to refraction, the bending of light rays through the air-water interface. But the side windows of the Tri-Vent are large enough to provide a good view of an object before it crosses to the front lens. It certainly makes buddy contact easier, allowing me to view the scenery through the front lens, while keeping track of my partner through the side.

When the first prototypes were made, SCUBAPRO's Research and Development staff knew they were on to something good. But some fine tuning was required. There were pockets and depressions in the skirt that trapped water. The turbulence caused by blowing splashed some of the water around within the mask.

"We would try to purge and just succeeded in washing our faces," SCUBAPRO engineer Jim Dexter recalled. The final version had a flat floor, and a gently curved lower frame, channeling water toward the purge valve. This one worked.

After testing lots of look-alike equipment, one tends to get jaded. But when something really new and different comes along, it can change the way you think about dive gear. This was my experience with the Tri-Vent. It was as though someone had just switched on a light, and suddenly I could see parts of the underwater world that had been missing. In the past, I hadn't liked three-window masks because they tended to tease me by barely making me aware of movement and color on the periphery. With the Tri-Vent, I could actually see and recognize objects to the sides.

The purge valve performs its function well. At first, I held the mask with both hands while looking downward—a holdover of old habits learned from manual clearing. There was a restriction, and I finally realized my hands were covering the ends of the tunnels in the bottom of the frame. Next, I tried purging holding only the center of the mask, and it worked beautifully. Then I did it with no hands, and that worked just as well. What a plus for photographers, or others who are carrying things underwater. After a few more trials, I found the best way to clear the Tri-Vent is to look downward at about a 45-degree angle, then blow slowly and steadily. Holding the mask is not necessary.

While shooting pictures for this article, I discovered another advantage for photographers. Underwater, noses are not very attractive. Magnification through the faceplate can make Elle McPherson's nose look like Cyrano de Bergerac's. A mask with a nose pocket just makes it look plastic. SCUBAPRO's Tri-Vent hides the model's nose behind the valve cover. Granted, it's a bit of a Darth Vader look, but it's the best way yet to deal with noses in underwater photographs.

By resurrecting the best features of an old design, and combining it with modern materials and technology, SCUBAPRO has introduced the first new concept in masks in 15 years. After using the Tri-Vent, going back to an ordinary mask is like going from high fidelity stereo to a transistor radio. The Tri-Vent mask is available in your choice of blue or orange frame, at your SCUBAPRO dealer.

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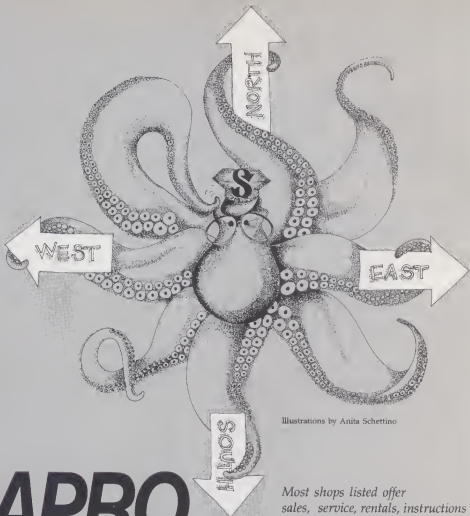
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Illustrations by Anita Schettino

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Ventura 93001
(805) 656-0167

Monday-Saturday: 9:30 to 6
Sunday: 10 to 5

Water Sports Unlimited

732 North H St.
Long Beach 90801
(805) 736-1800

Monday-Saturday: 10 to 6

COLORADO

110 East Beaver Creek Blvd.
Avon 81620
(303) 478-5397

Monday-Friday: 10-2, 3:30-8

Blue Mesa Scuba Center

1224 S. Townsend Ave.
Montrose 81401
(303) 249-8689

Monday-Saturday: 9 to 5:30

Denver Divers Supply

557 Milwaukee
Denver 80206
(303) 389-2877

Monday-Friday: 10 to 7
Saturday: 10 to 6

Diver's Reef

3014 N. Nevada
Colorado Springs 80907
(303) 634-3366

Monday-Saturday: 10 to 6

CONNECTICUT

Swim & Dive Center (Multi-Tech)
180 Flanders Rd.
Niantic 06357
(203) 739-9596

DISTRICT OF COLUMBIA

National Diving Center
4932 Wisconsin Ave. N.W.
Washington D.C. 20016
(202) 363-6123

Monday-Friday: 9 to 8
Saturday: 9 to 5
Sunday: 10 a.m. to 4 p.m. (5:30-10:30)

FLORIDA

ABC Sports Inc.
1915 Linhart
Fl. Myers 33901
(813) 334-4616

Monday: 10 to 5:30
Saturday: 10 to 12

A & H Aqua Sports

960 N.E. 62nd St.
St. Lauderdale 33334
(305) 778-5322

Monday-Saturday: 8:30 to 8
Sunday: 8 to 12

Adventure Scuba

150 N. U.S. Hwy. 1
Tequesta 33458
(305) 746-1555

Monday-Friday: 10 to 6
Saturday: 8 to 6
Sunday: 8 to 3

American Diving

Headquarters Inc.
Route 1, Box 2745
Key Largo 33037
(305) 451-0037

Daily: 7:30 to 8

American Scuba

and Water Sports
7429 U.S. Hwy. 19
New Port Richey 33552
(813) 848-5085

Monday-Saturday: 10 to 6

Aqua Adventures

1095 Bald Eagle Dr.
Marco Island 33937
(813) 394-DIVE
Daily: 9 to 8

Aqua Den Scuba

635 E. Silver Springs Blvd.
Ocala 32870
(904) 829-3355
Monday, Wednesday-Friday: 11 to 7
Saturday: 8 to 4
Closed Tuesday & Sunday

Aquanauts South

903 S.W. 87th Ave.
Miami 33174
(305) 262-9295
Monday-Saturday: 9 to 7

AquaShop

505 Northlake Blvd.
North Palm Beach 33408
(305) 848-9042
Monday-Friday: 9:30 to 6:30
Saturday: 7 to 6
Sunday: 7 to 4

Aquatic Center

2125 S.W. 34th St.
Gainesville 32608
(904) 377-DIVE
Monday-Friday: 10 to 7
Saturday: 10 to 5
Closed Sunday

Aquatic Divers

1327 South Federal Hwy.
Dania 33004
(305) 920-7626
Monday-Friday: 9 to 8
Saturday: 7 to 8
Sunday: 7 to 2

Buddy's Dive Shop

M.M. 60 Overseas Hwy.
Islamorada 33036
1-800-367-4707 In Florida
1-800-223-4707 Others
Daily: 8 to 8

Coastal Sport & Diving

2407 10th Ave. North
Lake Worth 33460
(305) 985-0524
Monday-Saturday: 10 to 7
Sunday: 7:30 to 2

D & S Diving

940 West Brandon
Brandon 33511
(813) 689-3483
Monday-Thursday: 10 to 8
Friday, 10 to 7
Saturday: 8 to 6

Dive Shop II

Sea Mist Marina
700 Casa Loma Hwy.
Boynton Beach 33435
(305) 734-5586
Monday-Friday: 9 to 7
Saturday & Sunday: 8 to 5

Dixie Scuba School

2555 No. Monroe St.
Tallahassee 32303
(904) 385-1840
Monday-Friday: 10 to 7
Saturday: 9 to 6

Franks Dive Shop

301 E. Blue Heron Blvd.
Riviera Beach 33404
(305) 849-7832
Monday-Friday: 8 to 5:30
Saturday & Sunday: 7 to 5:30

Hal Watts Mr. Scuba

2215 E. Colonial Rd.
Orlando 32803
(305) 898-4541
Monday-Friday: 1 to 8:30
Saturday: 9 to 8

Hall's Dive Shop

1994 Overseas Hwy.
Marathon 33060
(305) 743-5929
Daily: 9 to 6

Key West Pro Dive Shop, Inc.

1605 N. Roosevelt Blvd.
Key West 33040
(305) 298-3823

Ocean Pro Dive Shop Inc.

2259 Bee Ridge Rd.
Sarasota 33579
(813) 924-3483
Monday-Thursday: 10 to 6
Friday: 10 to 9
Saturday: 9 to 6

Panama City Dive Center

4823 Thomas Dr.
Panama City 32407
(904) 233-3590
Daily: 9 to 6

Scuba Shop

230 N. Eglin Parkway
Fort Walton Beach 32548
(904) 883-1341
Monday-Friday: 9 to 5
Saturday: 8 to 6

Scuba-Ski Inc.

118 9th St., South
Naples 33940
(813) 262-7389
Monday-Saturday: 10 to 8
Scubaworld of Tampa Inc.
7010 Sheldon Rd., Suite 500
Tampa 33615
(813) 887-1089

Sea Center Dive Shop

M.M. 29½ Rt. U.S. 1
Big Pine Key 33043
(305) 872-2319
Daily: 8 to 6

Skipper's Diving Center

408 E. Wright St.
Pensacola 32501
(904) 434-0827
Summer/Daily: 9 to 6
Winter/Closed Sunday

Submarine

940 N.E. 20th Ave.
Fort Lauderdale 33304
(305) 522-7722
Monday-Friday: 10 to 6
Saturday: 9 to 5

The Dive Shop

417 So. Federal Hwy.
Dunbar 33494
(305) 283-7433
Monday-Friday: 10 to 8
Friday: 10 to 8
Saturday: 9 to 8
Sunday: 8 to 12

Vortex Springs

Route 2, Box 18A
Ponce de Leon 32455
(904) 938-4979
Monday-Thursday: 7:30 to 5
Friday-Sunday: 7 to 7

GEORGIA

Charbon's Specialty Sports

850 Hawthorne Ave.
Athens 30606
(404) 548-7225
Monday & Wednesday: 9:30 to 6
Thursday & Friday: 9:30 to 8

Dive, Dive... Dive...

Ginnatt Anchor Corners Shopping Center
835 E. Silver Springs Blvd.
Duluth 30136
(404) 476-7833
Monday-Saturday: 10 to 7
Closed Sunday

Diving Locker

42 W. Montgomery Cross Rds.
Savannah 31406
(912) 927-6603
Daily: 10 to 6

Gerrard Dive Educators, Ltd.

2555 Deik Rd.
Marietta 30067
(404) 984-0382
Monday-Saturday: 10 to 9

Island Dive Center

1810½ Frederic Rd.
St. Simons Island 31522
(912) 838-6590
Monday-Saturday: 10 to 6
Sunday: 1 to 6

Planet Ocean Scuba Center

Windsor Village Shopping Center
Columbus 31909
(404) 563-8975
Monday-Friday: 10 to 6:30
Saturday: 10 to 5

HAWAII

Aloha Dive Shop

Koko Marina Shopping Center
Honolulu, Oahu 96825
(808) 395-8882, 5922
Daily: 8 to 5:30

Central Pacific Divers

7930 Front St.
Lahaina, Maui 96761
(808) 661-4561
Daily: 7 to 9

Fair Wind, Inc.

78-7128 Kaloopapa Rd.
Kailua-Kona 96740
(808) 322-2788
Daily: 7:30 to 5

Kohala Divers, Ltd.

P.O. Box 4935
Kailuahe 96743
Daily: 7 to 5

Kona Coast Skin Diver Ltd.

75-5614 Palani Rd.
Kailua Kona 96740
(808) 329-8802
Daily including holidays: 7 to 8

Lahaina Divers

162 Lahainaluna Rd.
Lahaina, Maui 96761
(808) 661-4505
Daily: 8 to 9:30

Ocean Activities Center

3750 Wailea Alanui D2
Wailea, Maui 96753
(808) 878-4485
Daily: 9 to 5

Ocean Adventures

406 Kam Hwy.
Pearl City, Oahu 96782
(808) 487-9080
Monday-Saturday: 8 to 6
Sunday: 8 to 4
Closed Wednesday

Rainbow Divers

1652 Wilkina Dr.
Wailua, Oahu 96786
(808) 622-4532
Monday-Friday: 9 to 6
Sat. & Sun.: 8 to 6

Sea Paradise

P.O. Box 5655
Kailua-Kona 96740
(808) 322-2500
Daily: 7:30 to 5:30

Sea Sage

4-1378 Kuhio Hwy.
Kapa, Kauai 96746
(808) 822-3841
Daily including holidays: 8:30 to 5

IDAHOO

The Scuba Diving Co.

219 W. 37th St.
Boise 83744
(208) 343-4470
Monday-Friday: 9 to 6:30

ILLINOIS

Anchor International, Inc.

315 W. Ogden Ave.
Westmont 60559
(312) 971-1060
Monday-Friday: 12 to 9
Saturday: 10 to 5, Sunday: 10 to 3

Anchor International

1790 Algonquin Rd.
Arlington Heights 60005
(312) 253-1960
Mon., Tues., Thurs., Fri.: 5 to 9

The Scuba Shop Inc.

800 Roosevelt Rd., Bldg. D-104
Glen Ellyn 60137
(312) 858-4485

IOWA

Dubuque Yacht Basin

1630 E. 16th St.
Dubuque 52001
(319) 556-7708
Monday-Friday: 10 to 6
Saturday: 10 to 3

Iowa State Skin Diving

Schools, Inc.
West University Plaza
7500 W. University Ave., Suite C
Des Moines 50311
(515) 255-8999
Monday-Friday: 10 to 7
Saturday: 10 to 6

INDIANA

Divers Supply Company, Inc.

3301 N. Illinois St.
Indianapolis 46208
(317) 923-5335
Mon., Wed. & Fri.: 9 to 7:30
Thurs. & Thurs.: 9 to 6:30
Saturday: 9 to 5

Divers World

1271 E. Morgan Ave.
Evansville 47711
(812) 423-2738
Monday-Friday: 10 to 6
Saturday: 8 to 5

DNP Diving, Inc.

1830 Erie Ave.
Logansport 46847
(219) 753-6377
Monday-Friday: 8 to 4

Pro Dive Shop

3023 Covington Rd.
Ft. Wayne 46804
(219) 432-7745
Mon., Tues., Thurs. & Fri.: 12 to 6
Saturday: 9 to 1

Underwater Adventures, Inc.

803 South Wayne St.
Angola 46703
(219) 665-7042
Monday-Thursday: 11 to 7
Friday: 11 to 9
Saturday: 9 to 4
Sunday: 12 to 4

KANSAS

The Dive Shop

7300 W. Frontage Rd.
Merriam 66204
(913) 677-3483
Daily: 10 to 7

KENTUCKY

Divers, Inc.

4807 Dixie Hwy.
Louisville 40216
(502) 448-7433
Monday-Friday: 10 to 7
Saturday: 10 to 5

Global Adventures

2708 Scottsville Rd.
Bowling Green 42101
(502) 843-8840
Daily: 10 to 7

Lexington Dive Shop

838 East High St.
Lexington 40502
(606) 266-4703
Monday-Friday: 11 to 7
Saturday: 11 to 5

Louisville Dive Shop

2478 Bardstown Rd.
Louisville 40205
(502) 458-8427
Monday-Friday: 11 to 7
Saturday: 11 to 5

LOUISIANA

Divers Destination of Louisiana

196 Mt. Vernon Dr.
Lafayette 70503
(318) 984-4578
Monday-Saturday: 10 to 6

Houma Watersports

3219 W. Main
Houma 70360
(504) 879-2900
Monday-Friday: 10 to 6
Saturday: 10 to 3

Sea Horse Diving Academy

5404 Crowder Blvd., Unit "E"
New Orleans 70127
(504) 246-8523
Monday-Friday: 11 to 7
Saturday: 10 to 6

Seven Seas

633 Oak Villa Blvd.
Baton Rouge 70815
(504) 926-1819
Monday-Saturday: 9:30 to 5:30

MAINE

Aqua Diving Academy

1153 Congress St.
Portland 04101
(207) 772-4200

Monday-Saturday: 10 to 5

Skin Diver's Paradise

RFD #3, Turner Rd., Box 817
Auburn 04210
(207) 782-7739

Monday-Friday: 2 to 9

Saturday: 7 to 8

MARYLAND

Bethany Water Sports

3220 Corporate Ct., Suite G
Ellicott City 21043
(301)461-DIVE

Monday-Friday: 10 to 7

Saturday: 10 to 5

Divers Den Inc.

8105 Harford Rd.
Baltimore 21234
(301) 666-6666

Mon., Tues., Thurs. & Fri.: 9:30 to 9

Wed. & Sat.: 9:30 to 5

The Scuba Hut, Inc.

139 Delaware Ave.
Glen Burnie 21051
(301) 761-4520

Mon., Wed. & Fri.: 10 to 6

Tuesday & Saturday: 10 to 6

Tide Water Aquatics

1315 Forest Dr.
Annapolis 21403
(301) 268-1992

Monday-Friday: 12 to 7

Saturday: 11 to 5

MASSACHUSETTS

Aquarius Diving Center Inc.

3239 Cranberry Hwy.
Buzzards Bay 02532
(617) 759-DIVE

Monday-Friday: 10 to 7

Saturday: 8 to 4

Merrimack Aquatic Center

171 Merrimack St.
Methuen 01844
(617) 688-5566

Monday-Friday: 11 to 7

Saturday: 12 to 4

Ultramarine Divers

46 Commonwealth Ave.
Concord 01742
(617) 369-1154

Daily: 10 to 8

United Divers, Inc.

59 Washington St.
Somerville 02143
(617) 668-0410

Monday-Friday: 10 to 8

Saturday: 9 to 6

Summer/Sunday: 9 to 4

Whaling City Diving Center

39 Main St.
Falmouth 02719
(617) 892-2662

Monday-Friday: 11 to 7:30

Saturday & Sunday: 9 to 4

MICHIGAN

Kalamazoo Dive Center

1622 Bloomfield Ave.
Kalamazoo 49001
(616) 345-2060

Monday-Friday: 10 to 7

Saturday: 10 to 5

Divers Incorporated

3380 Washburn Ave.
Ann Arbor 48104
(313) 971-7771

Monday-Friday: 10 to 6

Saturday: 10 to 5

Closed Tuesday & Sunday

The Dive Shop

G 4155 Fenton Rd.
Burton 48529
(313) 767-DIVE

Monday-Friday: 9 to 6

Late Appointments Available

Recreational Diving Systems

4424 N. Woodward
Royal Oak 48072
(313) 548-0303

Monday-Friday: 10 to 7

Saturday: 10 to 5

Scuba North, Inc.

13380 W. Bayshore Dr.
Traverse City 49684
(616) 947-2520

Monday-Thursday: 9 to 6

Friday: Saturday: 9 to 7

Sunday: 10 to 5

(Winter) Mon.-Sat.: 10 to 6

The Scuba Shack

9982 W. Higgins Lake Dr.
Higgins Lake 48627
(517) 821-6477

(Summer) Monday-Friday: 9 to 5

Saturday & Sunday: 8 to 8

Seaquatics, Inc.

979 S. Saginaw Rd.
Midland 48640
(517) 835-6391

Monday-Friday: 10 to 6

Saturday: 10 to 5

Skamt Shop

5055 Plainfield N.E.
Grand Rapids 49505
(616) 364-5418

Monday, Wednesday, Friday: 10 to 9

Tuesday, Thursday, Saturday: 10 to 8

Tom & Jerry's Skin

& Scuba Shop
20318 Van Born Ave.
Dearborn Heights 48125
(313) 278-1124

Monday-Friday: 11 to 7

Saturday: 11 to 5

ZZ Under Water World, Inc.

1806 E. Michigan Ave.
Livonia 48152
(517) 485-3894

Monday-Friday: 10 to 7

Saturday: 10 to 5

MINNESOTA

Central Minnesota Divers

102 E. St. Germain
St. Cloud 56301
(612) 252-7572

Monday-Friday: 10 to 7

Saturday: 9 to 5

Club Scuba East

2280 Maplewood Dr.
Maplewood 55109
(612) 484-7252

Monday-Friday: 10 to 8

Saturday: 10 to 5

(Summer) Sunday: 9 to 1

Club Scuba West

1300 E. Wayzata Blvd.
Wayzata 55391
(612) 473-4266

Monday-Friday: 10 to 8

Saturday: 10 to 5

(Summer) Sunday: 9 to 1

MISSISSIPPI

Skippers Diving

4441 N. State
Jackson 39206
(601) 362-6969

Monday-Friday: 10 to 6

Saturday: 10 to 5

South Mississippi Dive

& Sport Shop
Route 10, Box 418, Hwy. 49
Gulfport 39503
(601) 632-3826

Monday-Saturday: 10 to 7

MISSOURI

Divers Village

P.O. Box 323, Lake Rd. West 20
Lake Ozark 65049
(314) 365-1222

Daily: 9 to 6

John The Diver, Springfield

2421 South Campbell
Springfield 65807
(417) 881-0202

Monday-Friday: Noon to 8

Saturday: 10 to 5

Table Rock State Park Marina

S.R. 1, Box 911
Branson 65616
(417) 334-3069

Daily: sunrise to sunset

Nov. through Feb. open by appt.

The Dive Shop North

8135 North Oak
Kansas City 64118
(816) 436-5448

Monday-Friday: 10 to 7

Saturday: 10 to 5

NEBRASKA

Action Sports 'N' Sail

8823 Maple St.
Omaha 68134
(402) 391-5111

Monday-Thursday: 10 to 7

Friday & Saturday: 10 to 5

Big Mac Scuba & Sail

4711 Huntington St., Suite #1
Lincoln 68503
(402) 446-8404

Wednesday-Saturday: 10 to 5

Sunday: 11 to 5

NEVADA

Desert Divers Supply

5720 E. Charleston Blvd.
Las Vegas 89122
(702) 438-1000

Monday-Friday: 9 to 8

Saturday & Sunday: 8 to 6

Sierra Dive Co.

104 E. Grove St.
Reno 89502
(702) 825-2147

Mon., Tues., Thurs. & Fri.: 9 to 6

Wednesday: 9 to 9:30

Saturday: 10 to 5

NEW HAMPSHIRE

Atlantic Aqua Sports

522 Sagamore Rd.
Rye 03870
(603) 436-4443

Daily: 8 to 5, Closed Tues.

NEW JERSEY

Cedar Grove Divers Supply

492 Pompton Ave., Route 23
Cedar Grove 07009
(201) 857-1748

Tuesday-Friday: 12 to 9

Saturday: 10 to 5

Closed Sunday & Monday

Chatham Water Sports

76 Main St. (Route 24)
Chatham 07928
(201) 635-5313

Monday-Friday: 12 to 9

Saturday: 10 to 5

Professional Divers, Inc.

70 Hwy. 35
Neptune City 07753
(201) 775-6292

Monday-Friday: 11 to 8

Saturday: 10 to 6

Sunday (Summer): 9 to 1

Underwater Sports Inc.

Route 17 South
Rockledge Park 07662
(201) 843-3340

Monday: 10 to 7

Tues.-Fri.: 10 to 8

Sat.: 10 to 6

Whitehouse Aquatic Center

Box 97-C, Hwy. 22 West
Whitehouse Station 08899
(201) 534-4030

Monday-Saturday: 10 to 8

Sunday: 10 to 2

NEW MEXICO

New Mexico Society of Diving

4010 E. Main St.
Farmington 87401
(505) 325-2728

Monday-Saturday: 10 to 6

New Mexico Scuba Schools, Inc.

11200 Montgomery NE
Albuquerque 87111
(505) 292-7990

Monday-Saturday: 10 to 7

NEW YORK

Cougar Sports

917 Sawmill River Rd.
Ardsley 10502
(914) 693-8877

Monday-Wednesday: 10 to 8

Thursday: 10 to 7, Friday: 10 to 8

Saturday: 10 to 5

King County Divers Corp.

2417 Avenue U
Brooklyn 11229
(718) 648-4232 & 934-4153

Monday-Friday: 2 to 9

Saturday: 10 to 9

Niagara Scuba Sports

2048 Niagara St.
Buffalo 14207
(716) 875-6528

Mon., Tues., Thurs. & Fri.: 9 to 8:30

Wed. & Sat.: 9 to 5:30

Sunday (June through September): 9 to 11:30

National Aquatic Service, Inc.

1732 Erie Blvd. East
Syracuse 13210
(315) 478-5544

Monday-Friday: 9 to 5

Saturday: 9 to 4

Pan Aqua Diving

166 W. 75th St.
New York 10023
(212) 496-2267

Monday-Friday: 12 to 7

Saturday: 10 to 7

Suffolk Diving Center

58 Larksfield Rd.
E. Northport 11731
(516) 261-4388

Monday-Thursday: 10 to 6

Fri.: 10 to 8, Sat.: 10 to 6

Sunday: 10 to 3

Swim King Dive Shop

Rte. 25A
Rocky Point 11778
(516) 744-7707

Monday-Friday: 10 to 7

Saturday: 8 to 8

Sunday: 8 to 12

NORTH CAROLINA

Blue Dolphin Dive Shop

1006 National Hwy.
Thomasville 27360
(919) 475-2518

Monday-Thursday: 10 to 7

Friday: 10 to 9

Saturday: 8 to 6

Reef & Ridge Sports

532 E. Chatham St.
Cary 27511
(919) 467-3931

Monday-Friday: 11 to 6:30

Saturday: 11 to 3

Rum Runner Dive Shop Inc.

2905 East 5th St.
Greenville 27658
(919) 758-1444

Monday-Friday: 10 to 5

Sport Divers Inc.

2600 South Blvd.
Charlotte 28209
(704) 525-9234

Monday-Saturday: 9 to 6:30

OHIO

Buckeye Diving School

46 Warrensville Center Rd.
Bedford 44146
(216) 439-3677

Mon., Wed. & Fri.: 12 to 8

Tues. & Thurs.: 11 to 6

Saturday: 10 to 5:30

C & J Scuba

5825 North Dixie Dr.

Divers Paradise

2511 N. Reynolds Rd.
Toledo 43615
(419) 535-8828
Monday-Friday: 11 to 7
Saturday: 10 to 5

Ka-Puka-Wai Dive Shop

1508 Whipple Ave. N.W.
Canton 44708
(216) 478-2511
Monday & Thursday: 11 to 9
Tues., Wed., & Fri.: 11 to 6
Saturday: 10 to 5

Underwater Enterprises

832 Lake Ave.
Elyria 40335
(216) 323-9542
Monday-Friday: 2 to 9
Saturday: 9 to 6
Sunday: 9 to 11

The Waterline, Inc.

981 Dublin Granville Rd.
Columbus 43229
(614) 436-5004
Monday-Friday: 11 to 7
Saturday: 12 to 5
Closed Sunday

OKLAHOMA

Chalet Sports

2822 Country Club Dr. West
Oklahoma City 73118
(405) 840-1616
Monday-Saturday: 10 to 6

OREGON

Aquatic Sports & Scuba Center

10803 S.W. Barber Blvd.
Portland 97219
(503) 245-4991
Monday-Friday: 10 to 7
Saturday: 10 to 4

Northwest Divers Supply

852 S. Broadway
Coos Bay 97402
(503) 267-3723
Monday-Friday: 9 to 6
Saturday: 9 to 1

Tri-West Diving School

12604 S.E. Powell
Portland 97236
(503) 701-5435
Monday-Friday: 10 to 8
Saturday: 10 to 5

PENNSYLVANIA

Aquatic Horizons

1501 N. George St.
York 17401
(717) 848-6908
Monday-Friday: 8 to 8
Saturday: 8 to 4

B & B Marine Specialties

Hillsville-Bassam Rd.
Hillsville 16132
(412) 667-9448
Daily: 9 to 7

Bainbridge Dive Shop

R.D. #1, Box 23-1
Bainbridge 17502
(717) 426-2114
Daily: 9 to 7

D.J. Hydro Sports

2318 Peach St.
Erie 16502
(814) 455-5861
Monday-Friday: 9 to 6:30
Saturday: 9 to 4:30

Professional Diving Services

1135 Pittsburg
Springdale 15144
(412) 274-7719
Monday-Saturday: 9 to 9

RHODE ISLAND

Providence Aquatic Center

209 Elmwood Ave.
Providence 02907
(401) 274-4482
Monday-Friday: 10 to 8
Saturday: 9 to 6

Viking Dive Shop

124 E. Main Rd.
Middletown 02840
(401) 447-4179
Sun-Friday: 10 to 6
Sat.: 10 to 5:30

SOUTH CAROLINA

Neptune Dive & Ski, Inc.

133 Georgia Ave.
North Augusta 29841
(803) 279-2797
Monday-Saturday: 10:30 to 6
Waterline Diving School & Equipment

3202 Fernandina Rd.

Charleston 29210
(803) 731-9344
Monday-Friday: 10:30 to 6:30
Saturday: 10 to 6

SOUTH DAKOTA

Donovans Hobby & Scuba Center

1908 W. 42nd St.
Sioux Falls 57105
(605) 336-6945
Mon., Wed., Fri.: 9 to 9
Tuesday & Thursday: 9 to 6
Saturday: 9 to 4:30

TENNESSEE

Adventure Swim & Scuba

124 Northshore Dr.
Knoxville 37919
(615) 584-3483 or 691-2525
Monday-Saturday: 11 to 6
Closed Sunday

Diving Adventures

3046 Nolensville Rd.
Nashville 37211
(615) 333-DIVE(3483)
Monday-Saturday: 9 to 6
Nashville Scuba Center

110 13th Ave. North
Nashville 37203
(615) 255-4433
Monday-Saturday: 10 to 6

TEXAS

Aquaventures Dive Shop

4099 B. Caldar Ave.
Beaumont 77706
(409) 832-0254
Monday-Saturday: 9 to 6
Copeland's

4041 S. Padre Island Dr.
Corpus Christi 78411
(512) 854-1135
Monday-Friday: 10 to 7
Saturday: 9 to 5

Diver's Depot

720 South St.
Nacogdoches 75961
(409) 584-9822
Monday-Saturday: 10 to 6
Pro Scuba Supply

341 So. Bonner
Tyler 75702
(214) 393-6254
Monday-Friday: 9 to 6
Saturday: 9 to 4
Closed Sunday

School of Scuba

942 Walnut
Arlington 76010
(817) 277-1122
Monday-Saturday: 10 to 8
Scuba West

5500 Lincoln Sq.
Dallas 75206
(214) 750-6900
Monday-Saturday: 10 to 6:30
Scuba West

241 Skillman #104
Dallas 75243
(214) 348-8684
Scuba West
14902 Preston Rd., Suite 412
Dallas 75240
(214) 960-1300
Monday-Saturday: 10 to 6

Scuba West

2552 Joa Field Rd.
Dallas 75225
(214) 241-2900
Monday-Saturday: 10 to 6

Sport Divers of Houston, Inc.

125 West Bay Area Blvd.
Webster 77598-4111
(713) 338-1611
Monday-Friday: 10 to 7
Saturday: 10 to 6

Tradewind Diving Academy

5215 Sangar
Waco 76710
(817) 772-6674
Monday-Saturday: 10 to 6
Summer: 7 days

Trident Diving Equipment

2110 West Ave.
San Antonio 78201
(512) 734-7442
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Spokane 99207
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Wauwatosa 53213
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Wisconsin Rapids 54494
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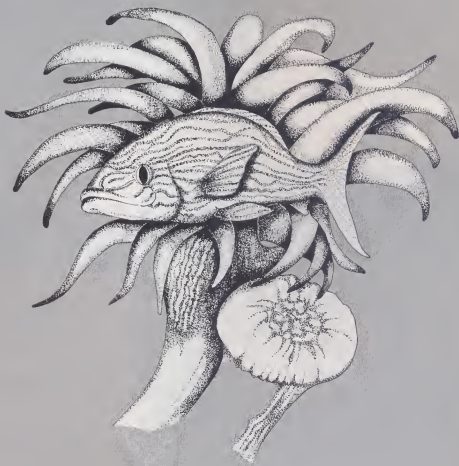
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SCUBAPRO

Trivia Quiz

Most American divers have visited the Caribbean, some many times. The following is a test of your knowledge of the area both from a diver's and a tourist's point of view.



Photo Courtesy St. Maarten Tourist Office



Photo by Darren Douglass

1. We'll start with an easy question. What is the largest island in the Caribbean?

2. If you dive the ABC islands, you'll be staying on which islands?

3. Alexander Hamilton was born on this small island.



Photo Courtesy Le Mer Diving Safari, Inc.

4. If you want to dive the deepest spot in the Caribbean, you'll have to go to this island. Bonus points if you can guess the depth within 5,000 feet.

5. If you want to dive the famous wreck of the Rhone, you'll have to go to this island.

6. If you are standing on the beach at Marigot, St. Martin, what island will be filling your view? Hint: Rudolph Bing of the Metropolitan Opera brought this island some notoriety.

7. What is the term for the relationship between a cleaner shrimp and the fish it removes parasites from?

8. In areas where coral growth is profuse, how is competition for space resolved?

9. Although Christopher Columbus died in Spain his request to be buried on this Caribbean Island was granted.

10. Which fish sleeps in a cocoon it secretes each night?

11. Remoras, which attach themselves to larger fish, are parasites. True or False?

12. Although the U.S. dollar is widely accepted in the Caribbean, what are the official currencies for each of these islands?

Bonaire _____	Dominican Republic _____
Guadeloupe _____	Puerto Rico _____
Jamaica _____	St. Kitts _____
Cayman _____	British Virgin Islands _____

13. Objects under water appear larger and closer, but by how much? 10 percent, 15 percent or 25 percent?

14. Snorkeling over a very shallow Caribbean reef, you wouldn't have to dive to reach the bottom if the snorkel was longer. Why are they so short?

15. These three islands plus the ABC islands comprise the Netherlands Antilles.

16. A passport is the best form of identification a traveling diver can carry. On most islands, a voter's registration card will also be accepted. A driver's license generally is not, why not?

17. A complete tour of the Cayman Islands would include?

18. If you were diving off Basse-Terre or Grande-Terre, which are linked by a drawbridge, you would be staying on this island?

19. If you step on a scorpion fish or a stonefish, would it be better to soak your foot in hot or cold water?

20. Six mammals are considered sea animals, what are they?

SCUBAPRO reserves the right to be wrong. We think we are correct but if you feel we have blown one, let us know. Check your answers against the ones on page 75. Now total your correct answers. If you scored:

0-5 You're just blowing bubbles.

6-10 You should have that "sinking feeling."

11-15 You've earned the gentleman's "C."

16-20 You're a certified quiz whiz.

At Green Turtle Cay in the Bahamas, a sailboating family sets off for a week to dive the waters of the out islands. Off Fort Pierce, treasure diver Bob Weller suits up to spend the best part of the day searching the bottom with his metal detector for long lost Spanish treasure. At Ocean-side Marina on Stock Island near Key West, diver Peter J. Cone will spend the day diving around the Keys and return with a limit of Florida lobsters.

All of these scuba trained, certified divers, have one thing in common; they

wise be limited to the air in their tanks or snorkeling because air fill stations are few and far between. Professionals, like Bob Weller, whose jobs or avocations require them to frequently spend great amounts of time working on the bottom, hardly have the time, or the inclination to surface to replace air tanks. SAS furnishes what they need without the encumbrance of a tank. And then there are people like Peter J. Cone.

The first time I saw Peter, he was planting a kiss on the underprow of his dive boat as it was being fork-lifted out of water at the marina. When I asked Peter how come, he quickly let me know his affection was not just for his faithful boat but also for the Surface Air Supply system that kept him catching lobsters from the other end of his 500-foot air hoses. How many lobsters? Would you believe his daily limit virtually every day of the season? Peter never sells any lobsters, his family lives on them and a lot of other seafood Peter catches, and he gives them to friends and business associates as gifts.

"I started tank diving at an early age," explained the 39-year old Key West resident. "My father purchased one of the first Aqualungs available after World War II and as soon as I was old enough, I got certified as a scuba diver. One day I noticed my landlord had mounted an air compressor and hoses on his boat for diving. I kidded him about using what seemed like a restrictive system."

That went on until Peter's landlord in-

competition from breath-hold divers because I can work deeper in the realm of scuba divers." Because of the amount of time he spends underwater, the unit is very practical.

The components of Peter's system consist of two oil-less compressors that can pump 100 pounds of air. They are powered by a five-horsepower Briggs and Stratton gasoline engine. His air reserve is a stainless-steel tank set to hold 100 psi of air. This provides him with five minutes of reserve at 20 feet should the unit shut off. Demand regulators at the ends of two 500-foot, brightly colored, floating air hoses are used for breathing. Peter's long hoses are not for deep diving, only for letting him work wider areas without moving his boat.

The term "hookah" is sometimes used to describe these units but is outdated. Hookah dates to the 1880's and was gear used by sponge divers. Are there advantages and disadvantages between SAS systems and scuba gear? All I can say is they are different, but here are some often asked questions about SAS systems:

How safe are they? As safe as any other system when used properly by a properly trained and certified diver. I am told SAS manufacturers will not sell a unit to an individual unless he or she provides proof of scuba certification.

The thing most criticized about SAS systems is the danger of a diver inhaling carbon monoxide from the gasoline engine. Manufacturers warn the units should not be operated in a closed area

Clearing the Air on Surface Air Supply

regularly dive for long periods of time without scuba tanks because they all use Surface Air Supply (SAS) systems.

These rigs basically consist of a gasoline engine coupled to a small air compressor hooked up to air hoses and second stage regulators. Some systems are designed to operate from the foredeck of a boat, while others fit an inflatable collar that floats above the divers.

SAS is not intended to replace scuba, it's just another way to go. Divers who like the idea of diving with unlimited air at a cost of pennies find SAS attractive. The family touring remote islands on their sailboat, for example, would other-

vited him to go diving with him on the Surface Air Supply system.

"I was instantly impressed by the lack of bulkiness of not having a tank on my back," he said. "It gave me more freedom of movement and much greater underwater speed if I had to chase a lobster. It was just a very different way of diving. It changed my whole outlook. In the last four years, I haven't had the

where this might be possible. On floating units, the engine exhaust is located low and the remote air intake is mounted on a mast almost three feet higher. Even longer remotes are available for deck-mounted units so the air intake can be hoisted high in a vessel's rigging if desired. Also, electric powered SAS units are available for deck mounting that eliminate the problem entirely.

BY ROBERT BURGESS

Robert Burgess is a Florida-based free-lance writer and photographer who has written several books about diving, as well as numerous magazine articles.

*Once called
hookah rigs,
SAS systems
are often
misunderstood
within the
diving
community.*



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PROFESSIONAL DIVING EQUIPMENT

The units are not designed for use in rough weather, but a splash won't shut them down. The units made by Brownie's Third Lung can be hosed down while operating.

While the air is surface supplied, it is still compressed when you breathe it. The user must observe the same rules about breath holding that you would on scuba. The Diving Tables also must be followed.

What happens if a diver is at depth on an SAS and the unit stops?

For one thing, you won't be instantly out of air. You will still get a breath or two out of the unit as you ascend. But to avoid apprehension about this, SAS manufacturers suggest everyone on the system dive with an air reserve such as a pony bottle or an alternate air source such as Spare Air which is a refillable DOT-rated cylinder smaller than your forearm with a built-in regulator, pressure indicator and On-Off valve capable of providing enough air for 30 or more breaths at the surface. Most SAS systems will provide two divers with three hours of diving time down to 50 feet on two quarts of fuel. This is well beyond decompression limits for that depth.

The cost of a SAS unit compared to scuba is another factor. A top of the line SAS system capable of diving two people down to 50 feet will cost about \$1,440. A bit steep unless you dive a lot or in remote areas.

A floating air supply is a compact unit weighing about 55 pounds, not including dive weights for two divers. Divers are unencumbered by the hose as any drag is taken up where the hose is snapped onto a fitting on the diver's quick-release weight belt at his waist. Since they are always linked to their floating air supply, the divers can't get separated or lost. The floating unit also provides divers with a floating support for the trip back to the boat.

Portability of the equipment is comparable to scuba. Masks, hoses, regulators, collapsed flotation collar, and belts will fit into a 25 x 36-inch nylon mesh bag. The engine, compressor, and intake air hoses will take up about as much room as a spare tire in the trunk of a car. Installed on its fiberglass mount and weatherproofed against saltwater corrosion, the unit is a nice compact answer to diving distant isles where air fills are nonexistent.

Divers interested in SAS systems need not rule out the possibility of building their own from component parts. Years before scuba was introduced in this country, my first homemade diving rig consisted of a flywheel air pump, a small gasoline engine and 50 feet of air hose. With a wood plug and brass fittings, I connected the hose to an Army surplus gas mask and made my first

dive with it to a Lake Michigan shipwreck in 1944. Our ignorance of inhaling exhaust fumes went unpunished even though the air intake was only about 12 inches from the exhaust and the whole thing was working in the bottom of an old rowboat. Guardian angels do look after the innocent.

Last summer in Key West a group of North Carolina divers showed up for lobster season with a homemade SAS system mounted in the bow of their boat. Their air collector was a stainless steel beer keg with so many hoses hooked to it it looked like an octopus. Most favor a three-horsepower Briggs and Stratton engine with a belt drive connecting an oil-less compressor. Peter Cone uses a Gast PCD-10 compressor. The unit sells for \$301.30 from Gulf Controlled Corp., P.O. Box 15100, Tampa, FL 33684, (813) 884-0471.

Four versions of ready-made SAS systems are available from two Florida manufacturers. There are other manufacturers. Super Snorkel (SS1) combines a three-horsepower gas engine with a diaphragm compressor mounted in an innertube with twin 40-foot floating hoses, demand regulators and a two-quart fuel supply. It'll give two divers four hours of diving time down to 40 feet. SS1 weighs less than 40 pounds and currently sells for \$709. A larger

model, Super Snorkel II, features a Teflon piston compressor, 60-foot air hoses and sells for \$928. Owner Cris Keller says he will also sell component parts and advise divers on custom-building SAS systems for special needs. Contact Innovative Designs Inc., 1870 Oak Creek Drive, Dunedin, FL 33528, (813) 784-5349.

Brownie's Third Lung Model 20-F is probably the Cadillac of SAS systems. It features a three-horsepower Briggs and Stratton engine and oil-less compressor that supplies 3.70 cubic feet of air per minute at 60 psi air for two divers down to 50 feet; or three divers to 25 feet. Compressor and engine are mounted atop a 25-inch diameter fiberglass dish with teak carrying handles for placing the unit into its dual chambered flotation collar. The Model 20-F sells for \$1,440.

Brownie's Third Lung also makes a Model 5-F whose compressor delivers 2.5 cfm at 30 psi for two divers to 30 feet, for \$1,045. Both electric and gasoline powered deck mounted units are also available. Owners Joe Sink and Robert Carmichael will gladly answer any of your questions. Contact them at Brownie's Third Lung, 940 N.W. 1st Street, Ft. Lauderdale, FL 33311; toll-free from outside Florida is 1-800-327-0412, or in Florida (305) 462-5570. \$

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Streaming With Gold

Divers prepare to submerge in the Yuba River. Air lines lead to the dredge and a surface air supply system.



I was so excited about our discovery I didn't notice the old guy come up behind me. When I felt his presence, I turned and stared straight into the image of Gabby Hayes, right down to the six-shooter.

He squinted hard at the floating gold dredge and the tattletale bubbles. The bubbles were coming from my brother. Nailed to the bottom by a 110-pound weight belt, 15 feet underwater, he was uncovering a crevice lined with gold nuggets.

The grizzled face stared at me, "You know, you boys is claim jumpin'?"

Right then I knew this was going to be a great summer.

Only weeks before, my brother and I had been beach lizards, lounging under a tropical sun, diving in tepid water, gawked at by gaudy fish and in general—bored. We needed a dive adventure, preferably a sunken vessel loaded with doubloons, but, unfortunately, sunken galleons are hard to come by.

Then we heard about an underwater gold rush. A gold rush started by, of all things, the weather. Hit by torrential rains that year, California experienced its worst storms in a century. Rivers stoked to high velocity boiled over their banks, sandbars were swallowed and mammoth boulders rolled about like marbles. When it was over, Mother Nature had not only rearranged her river furniture, she had also swept up scattered pockets of gold into concentrated deposits (placers). The famed placers that had brought prospectors in 1849 were again luring the gold hungry who were diving in the rivers and finding gold. Each year heavy rains wash gold into the rivers, but some years are far better than others.

Well, the reincarnation of Gabby Hayes decided not to blow us out of the water. In fact, after some quick talking, he took a liking to two greenhorns. We were given permission to stay on his claim. Later that evening, he told us about the original rush, when claims on his section of the Yuba River were limited to 30 feet per man, some claims produced \$80,000 in six months. When asked if he knew of any recent finds, he gave a whiskered grin, "Well just a piece down from here, a fella' with a dredge got into a deep hole that had never seen the light of day, he took out \$250,000."

As the campfire burned to embers, he told us about finds up and down the river, including some of his own. The stories got pretty wild and I made the El Grando mistake of challenging Ol' Gabby's truthfulness. He got that flinty look in his eyes, just like when he first caught us claim jumping. He went to his truck trailer and returned with something in his hand. "There's my credentials," he said, shoving a mason jar into the glow of the campfire. It was filled with gold nuggets, the biggest about the size of a golf ball.

Gabby became our mentor and the most important thing he taught us was to "think like gold." Gold has a personality that causes it to occupy certain areas in a river. First, gold is dense (eight

times heavier than rock). Because of this, it burrows like a gopher through the overlying gravel, right to the bedrock of a stream bed. Since we didn't want to dig a hole to China, we picked a spot where the bedrock was partially exposed. Next, gold is finicky about where it settles; it prefers the inside bend of rivers, large holes in the stream bed or the downstream side of an immovable boulder.

Finally, and this was a point we would appreciate again and again, gold is usually trapped in cracks in the bedrock. If the bedrock is smooth, those "sweet nuggets" slide right over the bottom. But if they hit a "glory seam," they jam, wedged like popcorn husks between your teeth.

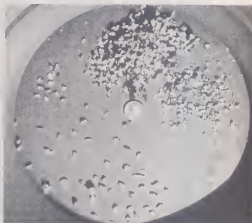
One of the ways we found gold was by "sniping." Sniping tools consisted of a spoon, a can, long tweezers and a gold pan. Using scuba gear, we'd float along like fat trout, snooping into all the cracks we found below water level. If we discovered a crevice packed tight with gravel, we had a potential hot spot. A hammer and chisel were used to loosen up the consolidated gravel which would then be carefully scraped out with a spoon, making sure to get all the way to the bottom. After collecting about half a coffee can of material, a gold pan was used to swirl off the worthless gravel and see if there was any gold. We used tweezers to reach any small nuggets that might be hiding just out of reach of the spoon. At \$400 an ounce we couldn't afford to be sloppy. The prettiest one-ounce nugget we saw came from a sniping crack just below water level.

We took sniping a step further by using a "snipe sniffer," actually a grease gun fitted with a rubber tube. We would stick the end of the tube into a narrow crack and pull back hard on the handle. The suction pulls gravel and gold flakes into the gun. A good snipe spot may mean more gold deeper down under the overburden. To remove the overburden requires a dredge.

We used a standard suction dredge manufactured by Keene Engineering. Two pontoons support a gasoline driven motor and an air compressor. The whole thing is small enough that two people can carry it. The compressor pumps air down to the diver through a hookah or SAS rig which is a long hose connected to the diver's second stage regulator. A three-inch hose connected to the pump acts like a giant underwater vacuum cleaner. Gravel is sucked up to a riffle tray on the surface where flakes of gold are trapped behind the riffle bars and the gravel flushed out.

For two saltwater rats, dredging in the

crystal clear waters of the Mother Lode was unforgettable. Weighted down by over a hundred pounds of lead, we would march into the river with the anaconda-like suction hose in tow. Once on the bottom, the excess weight gave stability in the current. Once the dredging started, our audience gathered. Big trout, looking for tasty morsels, came in and almost sat on our shoulders. They probably wondered why the big one-eyed neoprene trout was passing up all the tube-worms and hellgramites exposed by the suction nozzle. Fish seem to know to stay out of the way of the nozzle, crawdads aren't so smart. If it was getting near dinner-time, we would



Evidence there's still gold in the rivers and streams of California. Gold only divers can reach.

do a crawdad's version of "beam me up Scottie," sucking the surprised dad's to the surface riffle tray. Some days we might go gold hungry but we had the best crayfish dinners you can imagine.

When our gravel-gobbling dredge hit bedrock for the first time, the excitement began. We came down on a gravel packed crevice. As we chiseled it open, we hit a layer that contained lead fishing weights, some very old nails flattened on two sides, buckshot and a gold filling. The crevice was definitely a trap. Then tiny golden nuggets started to appear. Even though the dredge could literally suck your booties off, those nuggets were so dense they just quivered under the force of the nozzle.

When I brought the first nuggets to the surface my brother, not wanting to appear too excited, said, "Maybe they're fool's gold." So we put them to the test. If you turned them over in your hand, they did not sparkle. Fool's gold (iron pyrite) has a crystal structure that makes it twinkle in the light, raw gold seems to glow. Next, a knife was used to scratch the surface of a nugget. Gold will score easily, iron pyrite either flakes or proves difficult to scratch. Finally we

BY JIM WILTENS

Jim Wiltens is owner/director of Deer Crossing Wilderness Camp, an adventure camp located in the High Sierras.

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waiting for a bite. (A real pain in cold weather.) No more spooking your catch when your homemade line clip fails to release properly.

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dropped a nugget into some nitric acid. An hour later it was still there. We'd found gold.

That summer we found gold on the American, Feather and Yuba rivers. Ol' Gabbie had succeeded in teaching us to "think like gold." Whenever we pass a river, we can't help but wonder whether any gold is down there waiting. One section of river is particularly tantalizing. It is located near the site of an old hydraulic mining operation. Hydraulic mining used powerful jets of water to wash down entire hillsides. The resultant slurry was then passed through

giant riffle boxes. It's believed that reasonable quantities of gold were lost by this technique. After major storms this gold could be washed down into the nearby Yuba River. The real 'tub thumper' on this one, is a 15-foot dam built in the late 1800's not far down from this hydraulic wash. It is so old that it is completely filled in with stones and gravel and barely resembles a dam. This dam would act like one large riffle trap across the river. Any gold washed down by floods would be stuck at the base of the dam. How much we can only guess. Maybe we'll see you there this summer.

Editor's Note: Most productive, gold bearing rivers in California lie within national forest land and are open to the public. No permits are required unless a mechanical dredge is used. Dredging permits are issued by the California Department of Fish and Game and cost \$5 per year. Mining claims are still issued. Claim owners will usually permit divers to work their claim for a small percentage of what's found. Divers unfamiliar with California's gold bearing rivers might want to purchase a gold map. One series of maps are available from Big Ten Inc., Box 1231, Cocoa Beach, FL 32931. The California map is \$12 and shows all known gold bearing sights based on state and federal records. **\$**

Trivia Quiz Answers

(Continued from page 67)

1. Cuba.
2. Aruba, Bonaire and Curacao.
3. Nevis.
4. Puerto Rico Trench 31,037 feet deep.
5. Off Peter Island in the British Virgin Islands.
6. Anguilla.
7. Symbiotic.
8. The dominant species will kill the lesser one with a digestive enzyme.
9. Dominican Republic.
10. Parrot fish.
11. False, they feed off scraps missed by the larger fish.
12. Bonaire - Florin or Guilder
Guadeloupe - French Francs
Jamaica - Jamaican Dollar
Cayman Is. - Caymanian Dollar
Dominican Republic - Dominican Peso
Puerto Rico - U.S. Dollar
St. Kitts - Eastern Caribbean Currency
British Virgin Islands - U.S. Dollars.
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13. 25 percent.
14. Even at a depth of only four feet, where the pressure is only two pounds per square inch, it is applied to your total chest area and totals about 2,000 pounds making it impossible to inhale through a tube to the surface.
15. Sint Maarten, Saba and Sint Eustatius.
16. It does not show your place of birth.
17. Grand Cayman, Little Cayman and Cayman Brac.
18. Guadeloupe.
19. Very hot water as it breaks down the unstable protein in the venom.
20. Whales, Porpoises, Seals, Walrus, Sea Otters and Manatees. **\$**

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Best Shot

(Continued from page 36)

point the meter. Don't point it directly at the sun, even for sunburst effects. Point it about 20 degrees away from the sun to get the correct reading. Decide which part of the scene is important and expose for that area. Then make the strobe exposure match the ambient light.

Novice photographers expect too much from the strobe. Despite manufacturers' claims, even the widest beam won't cover the field of a 15mm lens. Remember that in wide-angle photography, the strobe is intended only for fill; ambient light determines the exposure. At the larger f-stops, you must power down your strobe. If its output is adjustable, set it at 1/2 or 1/4 power for any stop wider than f:8 when using 100 film. For 400 film, shoot at 1/4 power and hold the strobe back. This can be done by utilizing a long strobe arm, and keeping it behind your head or shoulder. If your strobe is not adjustable, hold it back or put a couple of fingers in front of it to cut down on its light. The result will be more subtle and natural lighting instead of sledgehammer strobe effects.

Be careful to avoid hitting nearby objects with light from the strobe when shooting fast film. Objects—especially

bright, reflective fish—will appear washed out and draw attention from your primary subject. In this case, aim the strobe beyond the fish, so they will appear as silhouettes.

Deep, wide-angle photography is not the place to use TTL (through the lens) automated exposure. The microchips in TTL sensors become narked underwater to a far greater degree than the diver. They will give false readings off the foreground, or from illuminated particles in the water column. In wide-angle pictures, especially at depth, you are restricted to manual photography. Few pros use TTL on anything besides close-ups, anyway.

Everyone from novices to professionals will probably feel a sense of rush or urgency at depth because of the pressure of reduced bottom time. Sometimes we fall prey to the assumption that unless we finish an entire roll of film, we have wasted our underwater time. Advertisements tell us we can expect 36 out of 36, and if we don't shoot them all, we haven't done the job. At depth, those expectations should be modified. There won't be time to shoot 36 good photos, so don't even try. Shooting 36 will usually result in 36 lousy pictures, because the good ones don't just happen. They are planned.

Relax. Concentrate on four or five good images. Then work on those images by bracketing different angles, exposures, and varying the composition. Any film you don't shoot can be rewound and shot topside.

If possible, scout the area without a camera before starting the shoot. Look for potential picture spots. This is especially important when photographing shipwrecks, where orientation and a feel for the entire scene is important. If this is a once-in-a-lifetime dive, and you know you won't be back, by all means take the camera. But if there will be a chance to return, scout first and shoot later.

Before becoming concerned with the effects of nitrogen narcosis, ask yourself,

"Do I really have to shoot this scene deep?" If it can be done in shallower water, do it there. The results will be better and more consistent. Only if this is a creature or a scene that isn't available shallow, is it worthwhile to go deep to shoot it.

Do lots of deep diving without a camera, working on mental set to counteract the effect of narcosis. Practice concentrating on depth and time calculations, and shoot mental pictures, estimating composition and exposures. It won't take long for you to feel comfortable at depth, then you will be ready to bring a camera.

If you want to practice new photographic techniques, do it shallow and learn them well before taking them deep. At depth, keep things simple. Use routine combinations of distances and f-stops that have always worked for you. This is not the place for a lot of experimentation. Instead, work on routine, conservative photography.

A major key to success at depth is to bracket. Shoot the scene several times, changing f-stops, strobe distance, and strobe placement. Instead of always having the strobe come in from the upper right of the picture, try moving it around. Holding it directly over your head is often an effective method of aiming, and helps to cut down on backscatter. Slight errors in strobe aiming are magnified at depth, and will result in improperly exposed pictures. Grabbing the strobe arm between your first two fingers (instead of between the thumb and forefinger) will aid aiming accuracy by minimizing bend in the wrist.

Don't forget that your body is more important than your photographs, and practice safe diving. The old adage, "Plan your dive and dive your plan," certainly applies here. In an ideal situation, a safety diver would be along who is not involved in photography or modeling. This isn't possible in most sport diving situations, so the model should back up the photographer's dive plan by keeping track of depths and bottom times. Keep in mind that the photographer is usually deeper than the model.

Automatic decompression computers are invaluable for tracking the kind of multilevel dive profiles generally used in deep, wide-angle photography. A computer can be as important as a good strobe or lens, by allowing the photographer to concentrate on pictures, while occasionally glancing at the computer to remain a no-decompression status.

Depth can be considered the dark side of the force for divers. But sometimes this is where the good photographs are. On the occasions that you go down after them, be prepared to cope with the depth and your success ratio will improve. **\$**



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(Continued from page 36)

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Winnepesaukee

(Continued from page 31)

shore in 15 feet of water, another one farther south lies in approximately 40 feet, and the third lies in 25 to 30 feet of water. A few years back, the deeper one had a plastic detergent bottled tied to her hull that floated within six feet of the surface. Another steam barge might have sunk in the 1960's on the southeastern shore of Paus Bay, but that hasn't been verified.

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In the same vicinity of the barge wrecks, adjacent to Pickerel Cove, lie the remains of the 88-foot, turn of the century yacht *Scamp*. According to Lyman Rice of Laconia, one of the former owners of the vessel, the *Scamp* was built in Boston and brought to Lake Winnepesaukee by train. She was closer to 70 feet in length with a long cabin with windows and powerful Buffalo engines. In the 1950's, after having several owners including the Sea Scouts of Lakeport, the *Scamp* was abandoned on the shore near Pickerel Cove. The bow protruded from the water or was on the shore for nearly a dozen years. At one time there was discussion about towing it into deeper water to improve the potential for diving. Today, it is a difficult wreck to locate since not much is left and few have actually seen it. Using the location given on the Navigation Chart of Lake Winnepesaukee, I wasn't able to locate the wreck, but it has been seen by some divers.

Other vessels in the lake include two horse boats. The horse boat, powered by two horses on a treadmill, was one of the earliest vessels on the lake and typical of Yankee ingenuity. Horse boats gradually became obsolete with the introduction of the steam engine. At least one has been found northwest of Jerry Point on the east side of Bear Island in 55 feet of water. Other reports suggest one was seen off the island in 25 feet.

On the east side of the lake off Ships Island lie four wrecks including two old cabin cruisers. Wolfeboro Bay with five wrecks, mainly large vessels, is another graveyard.

Divers can also enjoy other wonders of this glacial lake including caverns, rock formations, and ledges. At Clark's Point, cliffs, ledges and rock outcroppings in 40 feet of water lead to a sheer cliff that drops straight down to 105 feet. At Melvin Village one can search for Indian ruins. There is also an interesting dive on the west side of Diamond Island where underwater tracks and other equipment used in light diffusion experiments conducted by the University of New Hampshire can be observed.

The abundance of services on Lake Winnepesaukee coupled with scenic vistas of blue water and hundreds of islands against the backdrop of the majestic White Mountains make a visit a pleasant experience. Hopefully, divers will leave the wreck sites the way they find them so new generations of divers will have something to enjoy on the bottom of the lake. Destructive souvenir hunting will ultimately compromise the sites for all of us.

For more information contact Atlantic Aqua Sports in Rye or The Weirs Chamber of Commerce, Box 336B, Weirs Beach, NH 03246.

Down Under

(Continued from page 43)

ture of the turtle's eyeball.

"A huh," Ken sneered. "I thought it was supposed to be a whale, now it's a turtle. Make up your mind."

Ian suggested making it a shark. When I accused them of sour grapes, Ken just rolled his eyes. I glanced at my witness and said, "Well say something Hashish. They're laughing at us." It was no use.

We anchored our last evening off Snapper Island, in crocodile-infested water, according to Hermie. Several of us doubted this claim, but in an unsettling collaboration, the evening news reported that a man from Daintree had been eaten by an 11-foot croc earlier in the day, one leg left behind on shore. No one was interested in a night dive.

Whole baked coral trout appeared for dinner, marinated in white wine. Willie Nelson crooned over the sound system as we sat out on the deck finishing off the last of the vanilla ice cream drenched in hot chocolate, watching silver fish jump in the spotlight, spreading and falling back in umbrella-patterns, creating a kind of underwater fireworks.

I wanted to know what all the flags up in the pilot house were about. Ron explained they represented international distress signals that planes could read and with various combinations would communicate just about anything from "broken leg," to "need water." Ken wanted to know how to signal, "Out of chocolate topping."

The next morning Campbell and I sat on the front deck while Hermie raised the anchor for the last time. Suddenly he locked up the chain, reached down and began to untangle a confusion of arms belonging to a baby octopus clutching one of the links. Above us a sea eagle that had been circling all morning—waiting on the wind—set its wings and broke into a power dive. It hit the water with surprising force, then exploded back into the air thrashing awkwardly to gain altitude, one small fish in its talons. I looked down at Campbell who wasn't saying much. She just smiled and said, "You never found your wreck."

Off our port bow we could see the jagged silhouette of Cape Tribulation where Captain Cook made his first fatal error against the *Endeavor* in 1770 that began the grim history of wrecks on the Reef. The latest find has been the frigate *HMS Pandora* returning *Bounty* mutineers to her Majesty in 1786 that sunk like a ball-and-chain—three of the prisoners in tow, who the captain refused to unshackle. The Reef's never been much for sailors, but diving—now that's something.



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